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ABSTRACT

A comprehensive, field-disaggregated analysis of the academic labor market is presented using data from the National Center for Education Statistics for first-year graduate enrollment and higher degrees awarded in distinct fields. The fixed-coefficient model of Cartter (1975) is enlarged and disaggregated into a model of the supply of master's as well as doctor's degrees in 19 different academic fields. Past and present trends of the graduate students' choices of field and type of higher degree are analyzed. These trends are extrapolated, using the least square regression methods and adjustments on the grounds of plausibility considerations, and future graduate enrollment and numbers of higher degrees are projected. It was found that the majority of B.A. graduates still enroll in graduate or professional schools, but more seem to be seeking a degree lower than the doctorate. If trends continue, the share of Ph.D. production in engineering, mathematics, physical sciences, arts, letters, and social sciences, which totalled more than one-half of all Ph.D.s awarded before 1971, will decrease to less than one-third in 1983 and later. There appear to be noneconomic factors, such as concern for the physical and social environment, that influence educational and career decisions. A formal representation of Cartter's Global Model of Ph.D. Production, a description of the field classification employed, statistical data, and comments on the empirical data are included. (SW)

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Field Disaggregated Analysis and Projections of Graduate Enrollment and Higher Degree Production

A Report for
the Carnegie Council
on Policy Studies
in Higher Education

Christoph von Rothkirch

Project on Quantitative Policy Analysis Models
of Demand and Supply in Higher Education

Technical Report No. 5

October, 1978

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Christoph von Rothkirch

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Carnegie Council on Policy Studies
in Higher Education

Project on Quantitative Policy Analysis Models
of Demand and Supply in Higher Education

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1. Introduction and Survey

1.1 Types of Models of Graduate Higher Education

Since the end of the 1960s, when the booming growth of Higher Education in general and its graduate sector in particular was reduced to moderate annual increases or even decreases, much effort has been made to analyze these dynamics and find reliable projections of likely future developments. The threat of growing unemployment among Ph.D.'s, in particular, has caused researchers in universities and other agencies to develop models for analyzing, forecasting, and evaluating policy for the academic labor market.

The central part of all these models is graduate higher education, which directly influences market supply as well as demand. According to the principle underlying the functional specifications of student decisions concerning graduate enrollment and degree completion, two types of models can be distinguished.

By far the majority of existing models is represented by the so-called fixed-coefficient models. These are based upon the assumption that either the knowledge about the factors influencing the students' decisions is insufficient or that empirical data which could quantitatively represent these factors do not exist. In both cases, the model functions are reduced to time series of coefficients evaluated by relating graduate enrollment to B.A. degree numbers and Ph.D. degree numbers to graduate enrollment, respectively. Analyzing the dynamics of these coefficients provides information about the development of the 'Ph.D. production process.' Projections of future degree numbers can be obtained by means of coefficient extrapolation.

Fixed-coefficient models of graduate higher education were developed and used for analyses and projections, for example, by Adkins [1973], the Carnegie

Commission on Higher Education [1971], Cartter [1965a, 1965b, 1966, 1969, 1974, 1975], Haggstrom [1970], and the National Center of Education Statistics (NCES). This paper is closely related to the most comprehensive and most recent of these models (Cartter [1975]).

As opposed to the large number of fixed-coefficient models, only a few approaches are based upon the assumption that student enrollment and completion decisions can be theoretically and empirically explained by influencing factors. Most of the work on response models originates from Freeman [1971, 1973, 1974, 1976]. His econometric model of the graduate sector, for example (Freeman/Breneman [1974], pp. 46 ff.), combines the endogenous variables of first year graduate enrollment, faculty salaries, and number of Ph.D.'s with each other and with several exogenous variables representing the number of recently graduated B.A.'s, research and development spending, output of Ph.D.-intensive industries, salaries of alternative careers, and fellowship support.

Enlarging a fixed-coefficient model, Cartter, too, recently used a market response model to explain first year graduate enrollment by means of three influencing factors. In addition to the number of recently graduated B.A.'s he uses two other variables reflecting "R & D demand for scientists" and "the number of Junior academic position openings" (Cartter [1975], pp. 133-34).

1.2 The Necessity of Disaggregation

Nearly all of the existing models of graduate higher education are too crude with respect to their level of aggregation. They neglect that student enrollment and degree completion behavior is considerably different in distinct academic fields. Every bachelor, for example, who considers studying at the

graduate level, faces a twofold decision. First he has to make up his mind whether to enroll or not; then he has to choose a field of study. A global model has regard only for the first decision, whereas a field-disaggregated model can reflect both of them.

Disaggregation with respect to academic fields is especially necessary if a model is used for the evaluation of policies and the analysis of policy impacts. Present conditions, as well as likely future developments in the academic labor market, are not the same in all fields. Therefore, market adjustment policies based only on global analyses might improve one part of the market but impair another.

Among the cited authors, Adkins uses a field-disaggregated model to estimate the present, and likely future stock of degree holders in the U.S. population. Freeman conducted disaggregated investigations of the labor market for degree holders in certain specialities, for example physics and engineering.

In this paper, a further step is taken toward a comprehensive, field-disaggregated analysis of the academic labor market. Using NCES data for first-year graduate enrollment and higher degrees awarded in distinct fields, the fixed-coefficient model of Cartter [1975] is enlarged and disaggregated into a model of the supply of master's as well as doctor's degrees in 19 different academic fields. The methods used in the analyses are trend comparison and extrapolation. No hypotheses about graduate students' behaviour are presumed. The results, however, not only indicate that behaviour-explaining models must be constructed on a field-disaggregated level, but yield also plausible rationales concerning the factors influencing student decisions.

As can be seen from global enrollment and degree data, the majority of B.A. graduates still enroll in graduate or professional schools. More and more of those who enroll, however, do not aspire to the doctorate but are content with a lower-level degree.

This shift clearly indicates the students' responsiveness to changing job possibilities and prospects as considered in the models of Freeman and Cartter. The field-disaggregated analysis also supports the global findings. Since the beginning of the 1970s traditionally academic fields, such as English, foreign languages, mathematics, and social sciences, as well as research-oriented fields, such as engineering and the physical sciences, experienced a steady and strong decrease of shares of graduate enrollment. In contrast, graduate enrollment in professionally oriented fields, like, for example, architecture, business administration, computer science, and public administration, increased continuously above the average.

If these trends last in the near future, higher degree production in the 1980s will be considerably different from traditional patterns. The share of Ph.D. production in engineering, mathematics, physical sciences, arts, letters, and social sciences, which totalled more than one-half of all Ph.D.'s awarded before 1971, will decrease to less than one-third in 1983 and thereafter.

The field-disaggregated analysis of graduate enrollment and higher degree production, however, shows also that the economically-based hypothesis of market responsiveness cannot explain all recent changes. In agriculture, biological sciences, and education, for example, graduate enrollment as well as higher degrees awarded are still increasing, in spite of bad job prospects in those fields inside and outside academia. This development indicates that

there are also noneconomic factors, such as concern for the physical and social environment, that influence educational and career decisions. Hypotheses like these, however, can be taken into consideration only in field-disaggregated models.

The paper is divided into four chapters. Following this introduction, the second chapter contains a formal representation of the model, a description of the field classification used, and comments on the empirical data. In Chapter 3 past and present trends of the graduate students' choices of field and type of higher degree are analyzed. In the last chapter, these trends are extrapolated (by means of least square regression methods and adjustments on the grounds of plausibility considerations) and used for projecting future graduate enrollment and numbers of higher degrees.

2. Model and Data

2.1 Cartter's Global Model of Ph.D. Production

In order to explain the process of Ph.D. production Cartter [1975] used the following simple model. The three basic variables are

- (1) $BA(t)$ - number of bachelor's degrees awarded during the academic year $t/t+1$,
- (2) $FGE(t)$ - first year graduate enrollment at the beginning of $t/t+1$ (i.e., in fall of year t),
- (3) $PHD(t)$ - number of doctoral degrees awarded during $t/t+1$.

The three variables are linearly related by two coefficients. A graduate enrollment coefficient $RGE(t)$ measures the share of B.A.'s continuing to study at the graduate level. The simplest way of specifying this coefficient would be $FGE(t)/BA(t-1)$. This ratio, however, neglects the fact that not all B.A. recipients of one year become graduate students the following year. Reflecting this, Cartter replaces $BA(t-1)$ by a weighted average

$$(4) \quad \overline{BA}(t) = .4 BA(t-1) + .4 BA(t-2) + .2 BA(t-4) .$$

Cartter gives no empirically justified reasons for choosing just this weighting scheme. Results from questioning the class of 1961 indicate that the distribution of time delay between graduating and further enrollment shows a higher mean as well as a higher variance (cp. Haggstrom [1970], p. 27). Using (4) the graduate enrollment coefficient is

$$(5) \quad RGE(t) = FGE(t)/\overline{BA}(t) .$$

In order to evaluate a Ph.D. completion rate as a second coefficient, one must take into account that the duration of graduate studies towards a doctoral degree also varies widely among students. Though empirical results indicate a different distribution in this case as well, Cartter uses an equally weighted average of three to five years (i.e., four to six years of study). The number of Ph.D.'s is thus related to the auxiliary variable

$$(6) \quad \overline{FGE}(t) = [FGE(t-3) + FGE(t-4) + FGE(t-5)]/3 ,$$

and the PH.D. completion coefficient is defined by

$$(7) \quad RPHD(t) = PHD(t)/\overline{FGE}(t) .$$

In order to obtain a more complete description of the graduate part of higher education, we enlarge Cartter's model by evaluating also a completion coefficient for master's degrees. Using the additional variable

$$(8) \quad MA(t) - \text{number of M.A.'s awarded during the academic year } t/t+1 ,$$

and defining as the pool of possible M.A.'s the weighted average of graduate enrollees lagged by one or two years (two or three years of study), i.e.

$$(9) \quad \overline{FGE}(t) = [FGE(t-1) + FGE(t-2)]/2 ,$$

we define the M.A. completion coefficient by

$$(10) \quad RMA(t) = MA(t)/\overline{FGE}(t) .$$

2.2 Disaggregating Model

Let $I = \{1, \dots, n\}$ denote the index set of the academic fields according to a given classification. The basic variables of the disaggregated model are

$$(11) \quad FGE_i(t) ,$$

$$(12) \quad MA_i(t) ,$$

$$(13) \quad PHD_i(t) , i \in I ,$$

describing first-year graduate enrollment in fall of year t , and number of Master's and doctoral degrees, respectively, awarded during the academic year $t/t+1$, by field.

The logic of the disaggregated model is equivalent to that described above, with one exception: First-year graduate enrollment by field cannot be related to the number of B.A.'s awarded in the same or in other fields. This transition includes changes in field of study for which no sufficient empirical data are available. Instead, we take the global values $FGE(t)$ and disaggregate them into $FGE_i(t)$, $i \in I$, thus evaluating the relative frequencies

$$(14) \quad FFGE_i(t) = FGE_i(t)/FGE(t) , i \in I .$$

These choice coefficients represent indicators for the relative popularity of the different academic fields. They model the students' choice of a special subject to study in case the general decision in favour of graduate enrollment is made.

The further part of the disaggregated model results from indexing variables (3) and (8) and equations (6), (7), (9) and (10):

$$(15) \quad \overline{FGE}_i(t) = [FGE_i(t-3) + FGE_i(t-4) + FGE_i(t-5)]/3 ,$$

$$(16) \quad \overline{FGE}_i(t) = [FGE_i(t-1) + FGE_i(t-2)]/2 ,$$

$$(17) \quad RPHD_i(t) = PHD_i(t)/\overline{FGE}_i(t) ,$$

$$(18) \quad RMA_i(t) = MA_i(t)/\overline{FGE}_i(t) , i \in I .$$

2.3 Analysis and Projections

The empirical values of the enrollment and degree variables in past years are available through the publications of the National Center of Education Statistics (NCES). They can be used to analyze the processes of Ph.D. and M.A. production. This will be done in the following chapter by means of evaluating, on both the global and field-disaggregated levels, the choice coefficients $\overline{FGE}$ for the years 1960 to 1974 and the completion coefficients $RPHD$ and RMA for the years 1965 to 1973.

It is technically a simple matter to project future numbers of Master's and Doctor's degrees with the above model. Let $P = \{p_1, p_2, \dots\}$ denote the index set of those academic years for which actual data are not yet available, i.e., $P = \{1974, 1975, \dots\}$. If we assume that reliable projections of future total graduate enrollment are available (here we shall use values given by Cartter [1975]), degree projections at the

global level can be evaluated successively by means of equations (6) and (9) and

$$(19) \quad \text{PHD}(p) = \text{RPHD}(p) * \overline{\text{FGE}}(p), \quad p = p_1, p_2, \dots, \text{ and}$$

$$(20) \quad \text{MA}(p) = \text{RMA}(p) * \overline{\text{FGE}}(p), \quad p = p_1, p_2, \dots, \text{ resp.}$$

The field-disaggregated degree projections are obtainable via

$$(21) \quad \text{FGE}_i(p) = \text{FFGE}_i(p) * \text{FGE}(p), \quad p = p_1, p_2, \dots,$$

and indexed equations corresponding to (19) and (20).

The main problem in carrying-out these projections is evaluating reliable estimates of the future values of the coefficients RPHD , RMA , FFGE_i , RPHD_i , and RMA_i ($i \in I$). Possible solutions are discussed and applied in Chapter 4.

2.4 Remarks on the Field-Classification

The choice of a classification of academic fields for the disaggregated level of the model was not simple. The objective was to find a compromise between homogeneity and clarity. The more different fields are used, the more the model reflects actual decision making. This, however, at the cost of understandability. Besides, the choice is limited by the classifications of the data sources. The NCES publications Students Enrolled for Advanced Degrees and Earned Degrees Conferred are based upon a consistent field-classification only after 1971. In earlier years

the classifications of enrollment and degree data were different and were changed several times. In order to set up the basic data sets, corrections, were unavoidable. The final choice was a classification of academic fields. It is listed and described in Table 1. The data corrections that were necessary for homogenization are explained as comments to Table 1.

Tables 2-7 contain the resulting basic data sets of first year graduate enrollment (for the academic years 1960/61 to 1974/75) and of Master's and Doctor's degrees (for the years 1965/66 to 1973/74). Each data set is represented in absolute as well as percentage figures.

Table 1: Field-Classification

No.	Model- notation	Fields of Study Covered	NCES-Code
1	AGRC	Agriculture and Forestry	0100
2	ARCH	Architecture, City, Regional, and Environmental Planning	0200
3	BIOL	Biological Sciences	0400
4	BUSN	Business, Management, and Commerce	0500
5	COMM	Communication and Journalism	0600
6	CPSC	Computer and Information Sciences	0700
7	EDUC	Education	0800
8	ENGN	Engineering	0900
9	ARTS	Fine and Applied Arts	1000
10	HLTH	Health Professions	1200
11	LAW	Law	1400
12	LTTR	Letters, incl.: English, Literature, Foreign Languages, Philosophy, Religion	1100+1500
13	MATH	Mathematics and Mathematical Statistics	1700
14	PHYS	Physical Sciences, incl.: Chemistry and Earth Sciences	1900
15	PSYC	Psychology	2000

Table 1 (continued)

No.	Model-notation	Fields of Study Covered	NCES-Code
16	PUBL	Public Affairs and Services, incl.: Social Work and Social Administration	2100
17	SOCS	Social Sciences, incl.: History, Geography and Area Studies	0300+2200
18	PROF	Professional oriented fields: Home Economics, Library Science, Theology	1300+1600+2300
19	OTHR	Other fields, esp. Interdisciplinary Studies	4900

Comments on Table 1

a) Enrollment Data

Field	Years	Remarks
ARCH	1960-1965	2*Architecture
COMM	1960-1970	2*Journalism
LTTR	1960-1970	English & Literature + Foreign Language & Literature + Philosophy + Religion, Liberal Arts Curriculum + Religion, Other
PUBL	1960-1970	Public Administration + Social Work
SOCS	1960-1970	Social Sciences - Public Administration - Social Work + Geography
PROF	1960-1970	Home Economics + Library Science + Religious Education + Theology
OTHR	1960-1970	Total enrollment - Sum of enrollment in fields 1 to 18

b) Degree Data

Field	Years	Remarks
COMM	1965-1969	exogenously
ARTS	1965-1969	Fine & Applied Arts - 33% of Speech & Dramatic Arts
LTTR	1965-1968	English & Literature + Foreign Language & Literature + Philosophy + 30% of Religion (40% in case of Ph.D.'s) + 67% of Speech & Dramatic Arts
	1969	English & Literature + Foreign Language & Literature + Philosophy + Religion, Liberal Arts Curriculum + Religion, Other + 67% of Speech & Dramatic Arts

PUBL	1965-1969	Public Administration + Social Work
SOCS	1965-1969	Social Science - PUBL + Geography
PROF	1965-1968	Home Economics + Library Science + 70% of Religion (60% for Ph.D.'s)
	1969	Home Economics + Library Science + Religious Education + Theology
OTHR	1965-1973	Total - Sum of fields 1 to 18

TABLE 2: FIRST YEAR GRADUATE ENROLLMENT (FGE), BY ACADEMIC FIELD

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
AGRC	2169	2175	2405	2167	2877	3295	3232	3285	3346	3794	4205	5293	5658	5686	6575
ARCH	788	970	962	1084	1272	1554	1719	1900	2109	2779	3322	3515	4224	4970	5564
BIOL	7098	7612	8176	9750	11821	13608	14200	14874	14875	16285	17245	18042	18935	18991	20394
BUSN	17746	19139	20921	24646	32909	39345	40555	46110	49954	55715	61545	66392	66595	69638	82265
COMM	828	956	1082	1300	1534	1746	2256	2902	2454	2652	3795	3987	4377	5081	5689
CPSC	0	0	0	0	424	543	1487	1966	2622	4084	5026	4921	5125	5279	5332
EDUC	70984	80907	89935	97773	106237	120691	125593	151841	170131	180371	191748	189288	197255	215653	224751
ENGN	19915	21532	24047	27355	30245	32512	32279	33734	34438	36626	35477	30545	28501	28763	30914
ARTS	5915	6742	7455	8667	10163	12262	12756	15058	16102	17387	18696	14527	15936	17012	17303
HLTH	3549	3480	3507	4063	4587	5274	5682	5644	7140	7522	8270	12738	15066	17037	19078
LAW	1183	1305	1683	1896	2243	2300	2033	2120	2379	2215	2183	2165	2542	2703	2199
LTTR	12916	14876	16917	20557	24424	28428	29645	33328	33628	35532	36986	38727	37459	34763	34306
MATH	7493	7830	8897	10021	11830	12959	12624	13153	13299	13748	13604	11996	11261	9746	9493
PHYS	12225	12180	13226	14625	16123	16780	16503	17239	16825	16789	17356	16665	15333	14693	14543
PSYC	5521	5655	6252	7042	7678	8765	8459	10190	10645	12200	14262	14754	15678	16219	17270
PUBL	4456	4872	5242	6121	7552	8572	8317	9812	10236	11421	12324	16350	18806	22013	26793
SOC	18417	20140	21690	25296	31338	35243	35525	39546	39628	44331	47734	45305	43514	42608	41262
PROF	3825	4219	4665	5065	10369	11259	12572	14462	15616	15623	15017	17743	17839	19665	20723
OTHR	2152	3002	3306	3411	4182	4715	5324	10862	12909	14678	19148	15208	15761	11340	11891
TOTL	197180	217492	240468	270839	317808	358850	370772	428026	458334	494363	527934	528151	539985	561860	597695

TABLE 3. FGE PERCENTAGES, BY FIELD

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
AGRC	1.10	1.00	1.00	0.80	0.91	0.92	0.87	0.77	0.73	0.77	0.80	1.00	1.05	1.01	1.10
ARCH	0.40	0.40	0.40	0.40	0.40	0.43	0.46	0.44	0.46	0.56	0.63	0.67	0.78	0.88	0.93
BIOL	3.60	3.50	3.40	3.60	3.72	3.79	3.83	3.88	3.25	3.29	3.27	3.42	3.52	3.39	3.46
BUSN	9.00	8.80	8.70	9.10	10.35	10.69	10.94	10.77	10.90	11.27	11.66	12.57	12.33	12.39	13.76
COMM	0.42	0.44	0.45	0.48	0.48	0.49	0.51	0.48	0.54	0.54	0.72	0.75	0.81	0.90	0.95
CPSC	0.00	0.00	0.00	0.00	0.13	0.15	0.40	0.16	0.57	0.83	0.95	0.93	0.95	0.94	1.07
EDUC	36.00	37.20	37.40	36.10	33.43	33.63	33.87	35.47	37.12	35.61	35.33	35.84	36.53	38.38	37.60
ENGN	10.10	9.80	10.00	10.10	9.52	9.06	8.71	7.88	7.51	7.41	6.72	5.78	5.28	5.12	5.17
ANTS	3.00	3.10	3.10	3.20	3.20	3.42	3.44	3.52	3.51	3.52	3.54	2.75	2.95	3.03	2.89
HLTH	1.80	1.60	1.50	1.50	1.44	1.47	1.53	1.32	1.56	1.52	1.57	2.41	2.79	3.03	3.19
LAW	0.60	0.60	0.70	0.70	0.71	0.64	0.55	0.50	0.52	0.45	0.41	0.41	0.47	0.48	0.37
LTTR	6.55	6.84	7.04	7.59	7.69	7.92	8.00	7.79	7.34	7.19	5.99	7.33	6.94	6.19	5.74
MATH	3.80	3.60	3.70	3.70	3.72	3.61	3.40	3.07	2.90	2.78	2.58	2.27	2.09	1.73	1.59
PHYS	6.20	5.50	5.50	5.40	5.07	4.68	4.45	4.03	3.67	3.40	3.29	3.16	2.85	2.62	2.43
PSYC	2.80	2.60	2.60	2.60	2.42	2.44	2.29	2.39	2.32	2.47	2.70	2.79	2.90	2.89	2.89
PUBL	2.26	2.24	2.19	2.26	2.38	2.39	2.24	2.29	2.23	2.31	2.33	3.10	3.48	3.92	4.48
SOCs	9.34	9.26	9.02	9.34	9.86	9.82	9.58	9.24	8.65	8.97	9.04	8.58	8.06	7.58	6.90
PROF	1.94	1.94	1.94	1.87	3.26	3.14	3.39	3.39	3.41	3.16	2.85	3.36	3.30	3.50	3.47
OTHR	1.09	1.38	1.37	1.26	1.32	1.31	1.44	2.54	2.82	2.97	3.63	2.88	2.92	2.02	1.99
TOTL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 4: PH.D.'S AWARDED, BY FIELD

	1955	1956	1957	1958	1959	1970	1971	1972	1973
AGRC	588	637	648	699	823	1086	971	1059	930
ARCH	19	18	20	30	35	36	50	58	69
BIOL	2097	2256	2784	3051	3289	3645	3553	3536	3440
BUSN	387	437	445	533	503	810	902	932	983
COMM	90	100	110	115	120	145	111	139	175
CPSC	0	38	51	64	107	128	157	196	198
EDUC	3053	3529	4079	4829	5894	6398	7041	7314	7293
ENGN	2304	2614	2932	3377	3581	3638	3671	3492	3312
ARTS	476	504	528	684	734	621	572	616	585
HLTH	251	250	243	283	357	455	442	646	578
LAW	29	27	35	18	35	20	40	37	27
LTTR	1547	1791	2122	2324	2595	3197	3430	3745	3556
MATH	782	832	947	1097	1235	1199	1128	1058	1031
PHYS	3045	3462	3593	3959	4312	4390	4103	4006	3631
PSYC	1046	1231	1268	1551	1658	1782	1891	2089	2339
PUBL	64	64	77	90	131	178	211	219	230
SOC	2152	2522	2840	3184	3792	3803	4233	4393	4289
PROF	273	278	337	327	399	474	609	933	954
OTHR	24	31	24	73	55	91	155	199	196
TOTL	18237	20521	23084	26188	29855	32107	33370	34777	33826

TABLE 5: PH.D. PERCENTAGES, BY FIELD

	1955	1956	1957	1958	1959	1970	1971	1972	1973
AGRC	3.22	3.09	2.81	2.57	2.76	3.38	2.91	3.05	2.75
ARCH	0.10	0.09	0.09	0.11	0.12	0.11	0.15	0.17	0.20
BIOL	11.50	10.94	12.06	11.65	11.01	11.35	10.95	10.76	10.17
BUSN	2.12	2.12	1.93	2.04	2.02	2.52	2.70	2.68	2.91
COMM	0.49	0.48	0.48	0.44	0.40	0.45	0.33	0.40	0.52
CPSC	0.00	0.18	0.22	0.24	0.36	0.40	0.50	0.56	0.59
EDUC	16.80	17.11	17.67	18.44	19.73	19.93	21.10	21.03	21.56
ENGN	12.63	12.58	12.70	12.90	12.33	11.33	11.00	10.04	9.79
ARTS	2.61	2.44	2.29	2.61	2.46	1.93	1.71	1.77	1.73
HLTH	1.38	1.21	1.05	1.08	1.20	1.45	1.32	1.96	1.71
LAW	0.16	0.13	0.16	0.07	0.12	0.06	0.12	0.11	0.08
LTTR	8.48	8.69	9.19	8.87	8.59	9.95	10.28	10.77	10.51
MATH	4.29	4.03	4.10	4.19	4.14	3.73	3.38	3.07	3.05
PHYS	16.70	15.79	15.56	14.74	14.44	13.67	12.30	11.52	10.73
PSYC	5.74	5.97	5.49	5.92	5.58	5.55	5.64	6.01	5.91
PUBL	0.35	0.31	0.33	0.34	0.44	0.55	0.63	0.63	0.68
SOC	11.80	12.23	12.30	12.16	12.70	11.84	12.69	12.63	12.58
PROF	1.50	1.35	1.46	1.25	1.34	1.48	1.82	2.58	2.85
OTHR	0.13	0.15	0.10	0.28	0.18	0.28	0.46	0.57	0.58
TOTL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 6: M.A.'S AWARDED, BY FIELD

	1965	1966	1967	1968	1969	1970	1971	1972	1973
AGRC	1666	1761	1797	2070	1826	2457	2680	2807	2939
ARCH	762	986	1072	1158	1427	1705	1899	2307	2733
BIOL	4235	5003	5506	5743	5900	5728	6101	6253	6591
BUSN	12998	14894	17849	19325	21325	26544	30433	31166	32820
COMM	1046	1299	1460	1570	1724	1856	2200	2406	2642
CPSC	0	449	786	1123	1459	1599	1977	2113	2276
EDUC	50478	55861	63503	71076	79349	88716	97880	105242	112739
ENGN	13678	13880	15182	15240	15593	16443	16960	16619	15385
ARTS	5019	5812	6563	7413	7849	6675	7537	7254	8001
HLTH	2567	3417	3677	4067	4488	5749	7207	9362	9741
LAW	780	818	724	830	984	955	917	1048	1181
LTTR	11093	12415	14236	14768	14911	17465	17339	16638	16156
MATH	4772	5284	5527	5713	5636	5191	5199	5028	4840
PHYS	4992	5412	5499	5895	5935	6367	6287	6257	6087
PSYC	2530	3138	3479	4011	4111	4431	5289	5831	6616
PUBL	3912	4220	4725	5037	5640	8260	9365	10990	12694
SOCs	12918	14953	16160	18175	18452	17509	19417	18341	18439
PROF	6018	7390	8038	9449	10423	11163	11804	12153	12925
OTHR	1018	1001	967	1093	1459	1708	2143	2546	3464
TOTL	140772	157892	176749	193756	208291	230509	251633	263371	278259

TABLE 7: M.A. PERCENTAGES, BY FIELD

	1965	1966	1967	1968	1969	1970	1971	1972	1973
AGRC	1.18	1.12	1.02	1.07	0.88	1.07	1.07	1.07	1.06
ARCH	0.54	0.56	0.61	0.60	0.69	0.74	0.75	0.88	0.98
BIOL	3.01	3.17	3.12	2.96	2.78	2.48	2.42	2.38	2.37
BUSN	9.23	9.43	10.10	9.97	10.24	11.52	12.09	11.83	11.79
COMM	0.74	0.82	0.83	0.81	0.83	0.81	0.87	0.91	0.95
CPSC	0.00	0.28	0.44	0.58	0.70	0.69	0.79	0.80	0.82
EDUC	35.86	35.38	35.93	36.68	38.10	38.49	38.90	39.96	40.52
ENGN	9.72	8.79	8.59	7.87	7.49	7.13	6.74	6.31	5.53
ARTS	3.57	3.68	3.71	3.83	3.77	2.90	3.00	2.75	2.88
HLTH	2.04	2.16	2.08	2.10	2.15	2.49	2.86	3.17	3.50
LAW	0.55	0.52	0.41	0.43	0.42	0.41	0.36	0.40	0.42
LTTR	7.88	7.86	8.05	7.62	7.16	7.58	6.89	6.32	5.81
MATH	3.39	3.35	3.13	2.95	2.71	2.25	2.07	1.91	1.74
PHYS	3.55	3.43	3.11	3.04	2.85	2.76	2.50	2.38	2.19
PSYC	1.80	1.99	1.97	2.07	1.97	1.92	2.10	2.21	2.38
PUBL	2.78	2.67	2.67	2.60	2.71	3.58	3.72	4.17	4.56
SOCs	9.18	9.47	9.14	9.38	8.86	7.60	7.32	6.96	6.63
PROF	4.27	4.68	4.55	4.88	5.00	4.84	4.69	4.61	4.54
OTHR	0.72	0.63	0.55	0.56	0.70	0.74	0.85	0.97	1.24
TOTL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

3. Analysis

3.1 First Year Graduate Enrollment

In order to get a basis of comparison for the dynamics of first year graduate enrollment (FGE) in different academic fields, we look first at the development of total FGE. It tripled from 1960 to 1974, thus revealing an average annual rate of growth (AARG) of 8.5 percent. Three quarters of this growth, however, occurred between 1960 and 1969, when an AARG of 10.8 percent over 9 years resulted in 150 percent total growth. The period of 1969-1974, against that, shows only 21 percent total growth or an AARG of 3.8 percent. The minimal annual growth occurred from 1970 to 1971, when the relative increment of total first-year graduate enrollment was only .06 percent. Since then the annual rates of growth are steadily increasing (1971-72: 2.2 percent, 1972-73: 4.1 percent, 1973-74: 6.4 percent) but never reach the values of the 1960s.

The ups and downs in growth of total FGE have been analyzed by Haggstrom [1970] and Cartter [1975] for 1960-1969 and 1960-1971, respectively. Both authors use their analysis to evaluate projections. In Table 8 the different projections of FGE for the years 1970-1974 are compared with the actual values.

Table 8: Comparison of FGE Projections, 1970-1974 (in thousands)

Year	Actual	Haggstrom ¹			Extrapolation	Cartter ²		
		A	B	C		Market Response		
						I	II	III
1970	528	550	540	520	528*	528*	528*	528*
1971	528	610	580	560	525**	525**	525**	525**
1972	540	680	630	590	543**	543**	543**	543**
1973	562	740	680	630	569	567	565	560
1974	598	800	740	670	625	597	590	582

*actual, **indicated as "preliminary actual"

¹G. Haggstrom [1970], Table 7, p. 43-45.

²A. Cartter [1975], Table 7-3, p. 140.

All of Haggstrom's projections are too high. This is not surprising because the data then available did not cover the break of growth between 1970 and 1971. Cartter's first projection is based upon the extrapolation of the ratio of FGE to the number of B.A. graduates lagged one to four years (cp. ch. 2.1). The other three projections follow from a simple econometric model in which total FGE is explained by means of the variables B.A. graduates, expenditures for research and development, and academic job openings. The three variants reflect different schemes of weighting the explaining variables (cp. Cartter [1975], pp. 133 ff.).

Comparing the Cartter projections with the actual values shows quite good approximations for alternatives I and II of the market response model. According to Cartter the second alternative provides the most plausible projection. We shall use the respective values as exogenous projections of total FGE.

In order to analyze comparatively the development of FGE in different academic fields, we can use the average annual rates of growth of total enrollment as a measure of comparison. Table 9 contains for all fields and for the periods 1960-1969, 1969-1974, and 1973-1974 the differences between field-disaggregated and global AARG's, and, in an additional bottom row, the global AARG's. Thus the signs in the field rows indicate whether the average growth of FGE in a certain field during a certain period was stronger or weaker than the respective total growth. Besides, a negative figure, the absolute value of which exceeds the corresponding global AARG, reveals a field and a period of absolute decline in FGE.

In Table 9 the fields are not listed alphabetically but grouped according to the four possible combinations of signs in the second and third columns.

The first group containing ARCH, BUSN, COMM, CPSC, EDUC, PUBL, and PROF shows homogenously AARG's above the global values in 1960-1969 as well as in 1969-1974.

Table 9: Differences Between Average Annual Rates of Growth of FGE by Field and Average Annual Rate of Growth of Total FGE (in percentages)

Field	Periods		
	1960 - 1969	1969 - 1974	1973 - 1974
ARCH	4.3	11.0	5.6
BUSN	2.8	4.2	11.8
COMM	3.1	12.5	5.6
CPSC	46.6*	5.7	14.7
EDUC	.2	.6	- 2.2
PUBL	.3	14.7	15.3
PROF	6.2	1.9	1.0
AGRC	- 4.3	7.8	9.3
BIOL	- 1.1	1.0	2.6
HLTH	- 2.1	16.6	5.6
PSYC	- 1.5	3.3	.1
ENGN	- 3.8	- 7.2	1.1
LAW	- 3.5	- 4.1	- 19.8
MATH	- 3.8	- 11.0	- 9.0
PHYS	- 7.2	- 6.7	- 7.4
SOCs	- .5	- 5.3	- 9.5
ARTS	2.0	- 4.0	- 4.7
LITR	1.2	- 4.6	- 7.7
OTHR	13.0	- 8.0	- 1.5
Global AAG's	10.8	3.7	6.4

* for 1964-1969

The second group, set up by AGRC, BIOL, HLTH, and PSYC covers fields which experienced growth rates below the average in 1960-1969, but above it in 1969-1974.

The EMP-fields (i.e., ENGN, MATH, and PHYS), LAW, and SOCS, which together constitute the third group are characterized by AARG's below the global value in both periods. The bottom row indicates for all fields of this group that enrollment growth was below the average but positive in 1960-1969, however negative in 1969-1974, thus indicating absolute decline of FGE.

The fourth group, finally, is set up by ARTS, LTTR, and OTHER. It covers fields whose AARG was above the global value in 1960-1969 but below it in 1969-1974 (resulting also from absolute declining FGE numbers).

Though rather coarse, the grouping of Table 9 reveals interesting trends. Both first groups contain academic fields of increasing, both latter groups those of decreasing popularity. For the purposes of projection, it is important to know whether or not the development in 1969-1974 is likely to continue. If we look at the figures of the fourth column containing the growth rate deviations of the last empirically covered period, 1973-1974, we find only two cases of discontinuity. FGE in education which grew slightly stronger than total FGE since 1960 experienced a decline to a rate of growth, still positive but below the global value. The opposite change occurred in engineering, where FGE grew less than the global enrollment in the period 1960-1969, decreased in absolute terms from 1969 to 1972, started increasing again in 1972-1973, and grew stronger than total FGE in 1973-1974.

Because our information about FGE development is limited to the data of Table 2, we must be careful in drawing conclusions about graduate enrollees' decision making. Nevertheless the previous analysis provides some reasonable

hypotheses which should be tested by means of more sophisticated models. The development of total first-year graduate enrollment shows that still the greater part of B.A.'s want to continue studying at the graduate level. The students are, however, rather flexible with regard to their choice of an academic field.

The relative increase in more professionally oriented fields and simultaneous decrease in arts, humanities, and natural sciences reflects the students' responsiveness to changing conditions of the labor market in general and the academic labor market in particular. This economic hypothesis, however, cannot explain all shifts. Growth above the average in environmental design (as a major part of ARCH), public services, agriculture, biology, and, for a time long after the labor market for teaching jobs became tight, education suggests that many students' concern about their physical and social environment is strong enough to overcome pessimistic economic expectations.

Concluding this section, we look at the development of first-year graduate enrollment from another perspective. Table 10 contains, for selected years and for seven groups of related fields, the percentage shares of total FGE. The figures clearly show the shifts of graduate enrollment from academically and research oriented fields (Groups V and VI) to professionally oriented fields. (Groups I and II) and, though to a smaller extent, to fields of the social and physical environment (Groups III and IV).

Table 10: FGE Percentages Semi-Aggregated to Group of Related Fields

Group	Fields Contained	Years 1960	1969	1970	1971	1972	1973	1974
I	ARCH,BUSN,COMM,CPSC	9.8	13.2	14.0	14.9	14.9	15.1	16.7
II	HLTH,PSYC,PUBL,PROF	8.8	9.5	9.4	11.7	12.5	13.3	14.0
III	AGRC,BIOL	4.7	4.1	4.1	4.4	4.6	4.4	4.6
IV	EDUC	36.0	36.3	36.3	35.8	36.5	38.4	37.6
V	ENGN,MATH,PHYS	20.1	13.5	12.6	11.2	10.2	9.5	9.2
VI	ARTS,LITR,SOCS	18.9	19.7	19.6	18.7	17.9	16.8	15.5
VII	LAW,OTHR	1.7	3.4	4.0	3.3	3.4	2.5	2.4
I + II		18.6	22.7	23.4	26.6	27.4	28.4	30.7
III + IV		40.7	40.7	40.4	40.2	41.1	42.8	42.2
V + VI		39.0	33.2	32.2	29.9	28.1	26.3	24.7

3.2 Master's and Doctor's Degrees

In the previous section, we investigated the graduate students' choice to study in a certain academic field. Let us now find out what the degree data of Tables 3 and 4 reveal about the students' transition through the system of graduate education. Once we know how many students start in a certain field, we would also like to know how many of them finally get a master's or doctor's degree.

In order to provide this kind of information, we can relate the number of degrees awarded in year t to the number of first year enrollees several years before t . The resulting completion coefficients (CC's) are listed in Table 11 (for Ph.D.'s) and Table 12 (for M.A.'s). They are evaluated according to formulas (7), (10), (17), and (18) of Chapter 2.

TABLE 11: PH.D. COMPLETION COEFFICIENTS, BY FIELD (IN PERCENTAGES)

	1965	1966	1967	1968	1969	1970	1971	1972	1973
AGRC	26.14	28.32	26.10	25.15	26.25	33.20	29.53	30.47	24.59
ARCH	2.18	1.85	1.81	2.30	2.31	2.09	2.62	2.56	2.52
BIOL	27.49	26.50	28.08	26.02	24.90	25.62	24.94	23.70	21.32
BUSN	2.01	2.03	1.70	1.67	1.62	1.94	1.98	1.84	1.76
COMM	9.42	8.99	8.43	7.53	6.50	6.30	4.37	5.20	5.90
CPSC	0.00	0.00	36.09	19.86	13.08	9.61	8.25	6.78	5.06
EDUC	3.80	3.94	4.16	4.45	5.02	4.82	4.72	4.35	4.03
ENGN	10.55	10.75	10.77	11.24	11.62	11.08	10.96	10.00	9.33
ARTS	7.10	6.61	6.03	6.60	5.26	4.65	3.91	3.81	3.36
HLTH	7.08	6.73	5.95	6.10	5.89	8.42	7.18	9.54	7.56
LAW	2.09	1.66	1.86	0.84	1.60	0.93	1.84	1.65	1.20
LTTR	10.38	10.26	10.28	9.50	9.44	10.49	10.65	10.96	10.06
MATH	9.69	9.33	9.24	9.45	9.91	9.29	8.66	7.97	7.61
PHYS	24.28	25.94	24.51	24.36	26.18	26.06	24.34	23.63	21.37
PSYC	18.01	19.49	18.14	19.81	20.09	19.50	19.26	18.97	18.91
PUBL	1.32	1.18	1.22	1.21	1.61	2.00	2.23	2.09	2.03
SOCS	10.72	11.27	10.88	10.40	11.14	10.34	11.07	10.67	9.77
PROF	6.44	5.98	5.03	3.68	3.50	3.71	4.28	6.12	6.25
OTHR	0.85	0.96	0.66	1.78	1.16	1.31	1.60	1.55	1.26
TOTL	8.35	8.49	8.35	8.29	8.55	8.32	7.96	7.56	6.85

TABLE 12: M.A. COMPLETION COEFFICIENTS, BY FIELD (IN PERCENTAGES)

	1965	1966	1967	1968	1969	1970	1971	1972	1973
AGRC	66.06	57.06	55.06	63.53	55.07	68.82	67.01	59.17	53.72
ARCH	64.69	62.70	65.51	64.00	71.21	69.78	62.25	67.49	70.63
BIOL	39.27	39.35	39.60	39.51	38.99	36.77	36.39	35.50	35.54
BUSN	45.13	41.81	45.24	44.60	44.40	50.24	51.91	48.72	49.36
COMM	73.82	79.15	72.96	60.88	64.38	72.56	68.24	61.91	63.18
CPSC	0.00	92.86	77.44	65.04	63.60	47.36	43.40	42.49	45.31
EDUC	49.49	49.23	51.57	51.24	49.29	50.54	52.52	55.24	58.33
ENGN	47.49	44.23	46.87	46.17	45.75	46.28	47.04	50.34	52.11
ARTS	53.31	51.84	52.47	53.30	50.38	39.86	41.78	43.67	52.53
HLTH	66.29	69.30	67.12	71.82	70.21	78.42	91.27	79.61	70.07
LAW	37.69	36.01	33.42	39.97	39.30	41.58	41.70	48.21	50.18
LTTR	49.32	46.98	49.03	46.90	44.54	50.51	47.89	44.01	42.41
MATH	43.68	42.63	43.21	44.33	42.61	38.39	38.01	39.28	41.62
PHYS	32.47	32.90	33.04	34.94	34.95	37.88	36.83	36.78	37.97
PSYC	34.38	39.17	40.40	43.02	39.46	38.79	39.97	40.19	43.48
PUBL	57.22	52.34	55.95	55.57	56.26	76.28	78.88	76.65	72.22
SOCS	45.62	44.92	45.67	48.42	48.61	41.71	40.01	39.43	41.52
PROF	77.98	68.34	67.46	69.90	69.31	71.47	77.05	74.19	72.65
OTHR	26.81	22.50	19.26	13.51	12.28	12.38	12.67	14.82	22.37
TOTL	47.83	46.67	48.45	48.51	47.00	48.39	49.23	49.88	52.10

Because the time lags used are not empirically substantiated, the CC's are to be viewed mainly as indicators of the dynamic development of degree completion behaviour. Moreover, the interpretative value of the CC's is restricted by the fact that average completion time varies from field to field. The figures of Tables 11 and 12 provide only an ordinal type measure for inter-field comparisons.

In investigating the completion coefficients we are interested in two main questions: (i) What does the recent development of global CC's reveal about general completion behaviour? (ii) Are there academic fields showing significant deviations from global trends?

As to the first question, Tables 11 and 12 demonstrate clear trends for 1969-1973. During these years the global completion coefficient for master's degrees increased steadily from 47 percent in 1969 to 52.1 percent in 1973, thus growing by total 10.9 percent, or an average annual rate of 2.6 percent. The global coefficients for Ph.D.'s, against this, show a steady decline from 8.6 percent (1969) to 6.9 percent (1973), i.e., a total reduction of 19.8 percent or an annual average of 5.4 percent. In both cases, the annual rates of growth or shrinkage, respectively, increase towards the end of the period, thus indicating that the trends are likely to continue or even intensify in the near future.

The global Ph.D. completion coefficients can be compared with the values evaluated by Cartter [1975, p. 83, Table 5-5], on the basis of actual Ph.D. data up to 1972. Cartter's projection for the CC of 1973 is 7.4 percent, which results in forecasting 36,590 doctoral degrees to be awarded. The actual number of Ph.D.'s in 1973, however, was quite unexpectedly only 33,826. This absolute decline of Ph.D.'s, which happened for the first time since 1956, results in the low CC of only 6.9 percent.

In a comparative analysis of completion behaviour in single academic fields it is convenient to look simultaneously at the percentage distributions of FGE on one hand (Table 3), and of degrees awarded on the other (Table 5, Ph.D.'s and Table 7, M.A.'s).

To begin with, among the Ph.D.'s we find some striking differences in completion behaviour in different fields. Consequently, the percentage distributions of FGE and of Ph.D.'s differ considerably. The highest CC's in all considered years are found in AGRC, BIOL, PHYS, PSYC (ordered by decreasing values). They are all above 20 percent. CC's above the global values show also LTTR, SOCS, and ENGN (all about 10 percent). The share of total Ph.D. production in these fields exceeds the respective share of FGE. In BIOL and PHYS, for example, the Ph.D. percentage values in 1973 are 10.2 percent and 10.7 percent, respectively, thus about three times the corresponding average FGE shares for the years 1968-1970 (3.3 percent and 3.7 percent). The opposite extremal relation is valid, e.g., for BUSN and EDUC, where CC's considerably below the global values result in Ph.D. percentages far below the corresponding FGE shares.

Compared with these differences, the completion coefficients for Master's degrees are (in all considered years) far less scattered around the global values. Consequently, the percentage distributions of FGE and M.A.'s are rather similar.

If we compare the completion coefficients of both degrees with each other we can group the fields according to their importance for the total production of higher degrees.

Typical "Ph.D. fields" are BIOL, the fields, LTTR, PSYC, and SOCS. In these fields the doctoral CC's are generally above, the Master's CC's, however, below the corresponding global values. ARCH, EDUC, PUBL, and PROF,

against that, show comparatively high M.A. coefficients, but low values for Ph.D.'s. The other fields are exceptional in either direction. AGRC, CPSC, in former years, and, in recent years, HLTH, show CC's above the global values for both degrees. A reason for this might be that in these fields more students attain first the master's in their program toward the doctorate.

Coefficients below the global values for both degrees are found for BUSN, LAW, OTHR, and, in recent years, in ARTS and CPSC. Such findings force the supposition that in these fields comparatively more students drop out before completing any degree. There are different reasons that could explain this behavior. In BUSN, LAW, and CPSC students more frequently drop out because they can get good jobs without holding a higher degree. In ARTS and OTHR (which contains mainly interdisciplinary subjects of study) there are probably more students who do not aspire to any higher degree.

For the purposes of projecting future numbers of higher degrees, we have to check the completion coefficients with respect to trends in recent dynamic development. As to the Ph.D.'s, the general direction is, as already indicated by the global values, downward. CPSC, EDUC, the EMP-fields, ARTS, and PSYC show steadily decreasing CC's since 1969. In BIOL the downward movement started in 1970, and in ARCH, BUSN, LAW, PUBL, SOCS, and OTHR in 1971. PROF and COMM experienced a steady increase (since 1969 and 1971, respectively). The remaining fields AGRC, HLTH, and LTTR don't reveal clear trends. Comparing their most recent data of 1973 with the average of CC's in former years yields downward development in AGRC and LTTR, but an upward change in HLTH.

The completion coefficients of master's degrees are, in their dynamic development as well, less homogenous. Continuously increasing CC's are found in EDUC, ENGN, ARTS, LAW, and OTHR since 1969, in PSYC since 1970, and in ARCH, MATH, and PHYS since 1971. These fields reflect the global trend of CC's, which is decreasing in the case of Ph.D.'s, but increasing in the case of M.A.'s.

In BIOL (since 1969), AGRC and LTTR (since 1971) the completion rates for master's degrees decline. As to the remaining fields, only in PUBL the values in most recent years are clearly different from (in this case greater than) the average of former values.

We get a coarser but more homogenous picture of the trends in higher degree production if we look at the completion coefficients and the degree distributions at a semi-aggregated level resulting from grouping related fields. The respective figures are shown in Tables 13-16. The underlying groups are equal to those used in Table 9.

On this level of aggregation, the CC's for Ph.D.'s decline clearly at least for the last two years in all but Group III. As to the Master's degrees (Table 14), the trend directions are downward in GROUP III, but upward in Groups IV, V, and VII.

In order to estimate the future production of higher degrees and its composition by academic fields, we have to combine projections of the above completion coefficients with recent actual and projected values of enrollment choice coefficients. This will be done in the following chapter.

**Table 13: Ph.D. Completion Coefficients for Groups of Related Fields
(in percentages)**

Group	Fields Contained	Years 1965	1969	1971	1972	1973
I	ARCH,BUSN,COMM,CPSC	2.4*	2.1	2.4	2.3	2.2
II	HLTH,PSYC,PUBL,PROF	8.9	7.7	8.3	8.9	8.8
III	AGRC,BIOL	27.2	25.2	25.8	25.0	21.9
IV	EDUC	3.8	5.0	4.7	4.4	4.0
V	ENGN,MATH,PHYS	14.4	13.8	14.1	13.1	12.1
VI	ARTS,LTTR,SOCS	10.0	9.7	9.7	9.6	9.2
VII	LAW,OTHER	.5	1.3	1.6	1.6	1.3

**Table 14: M.A. Completion Coefficients for Groups of Related Fields
(in percentages)**

Group	Fields Contained	Years 1965	1969	1971	1972	1973
I	ARCH,BUSN,COMM,CPSC	47.2*	47.2	52.6	49.8	50.9
II	HLTH,PSYC,PUBL,PROF	58.4	58.9	69.7	65.0	65.1
III	AGRC,BIOL	44.3	41.9	42.3	40.5	39.7
IV	EDUC	49.5	49.3	52.5	55.2	58.3
V	ENGN,MATH,PHYS	42.5	42.2	42.6	44.4	46.0
VI	ARTS,LTTR,SOCS	48.2	46.5	43.2	41.8	43.6
VII	LAW,OTHER	30.7	16.6	16.0	18.6	26.0

* without CPSC

Table 15: Ph.D. Percentages Semi-Aggregated to Groups of Related Fields

Group	Fields Contained	Years					
		1965	1969	1970	1971	1972	1973
I	ARCH,BUSN,COMM,CPSC	2.7	2.9	3.5	3.7	3.8	4.2
II	HLTH,PSYC,PUBL,PROF	9.0	8.6	9.1	9.4	11.2	12.1
III	AGRC,BIOL	14.7	13.8	14.7	13.8	13.5	12.9
IV	EDUC	16.8	19.7	19.9	21.1	21.0	21.6
V	ENGN,MATH,PHYS	33.6	30.9	28.7	26.7	24.6	23.6
VI	ARTS,LTTR,SOCS	22.9	23.8	23.7	24.7	25.2	24.9
VII	LAW,OTHR	.3	.3	.4	.6	.7	.7
I + II		11.7	11.5	12.6	13.1	15.0	16.3
III + IV		31.5	33.5	34.6	34.9	34.5	34.5
V + VI		56.5	54.7	52.4	51.4	49.8	48.5

Table 16: M.A. Percentages Semi-Aggregated to Groups of Related Fields

Group	Fields Contained	Years					
		1965	1969	1970	1971	1972	1973
I	ARCH,BUSN,COMM,CPSC	10.5	12.5	13.7	14.5	14.4	14.5
II	HLTH,PSYC,PUBL,PROF	10.9	11.8	12.8	13.4	14.2	15.1
III	AGRC,BIOL	4.2	3.7	3.6	3.5	3.4	3.4
IV	EDUC	35.9	38.1	38.5	38.9	40.0	40.5
V	ENGN,MATH,PHYS	16.6	13.0	12.1	11.3	10.6	9.5
VI	ARTS,LTTR,SOCS	20.6	19.8	18.1	17.2	16.0	15.3
VII	LAW,OTHR	1.3	1.1	1.2	1.2	1.4	1.7
I + II		21.7	24.3	26.5	27.9	28.6	29.6
III + IV		40.1	41.8	42.1	42.4	43.4	43.9
V + VI		37.2	32.8	30.2	28.5	26.6	24.8

4. Projections

4.1 Alternative Extrapolation Methods

The projections to be presented and compared in this chapter are commonly based on two general assumptions:

- (i) Total first year graduate enrollment is expected to develop as given by alternative II of the "market response model" of Cartter. The respective values are shown in Table 17.

Table 17: Projection of Total FGE (in thousands)¹

Year	FGE	Year	FGE	Year	FGE
1974	598*	1980	619	1986	604
1975	612	1981	590	1987	653
1976	618	1982	569	1988	646
1977	630	1983	545	1989	616
1978	646	1984	548	1990	596
1979	636	1985	559		

* actual

- (ii) In the near future, choice of field as well as degree completion behavior generally follow the trends effective since 1969.

These two assumptions are only general guidelines. They do not specify concrete methods of trend evaluation and projection. The shortness of the reference period does not allow the application of trend evaluation methods of higher order. Unadjusted extrapolations of linear trends, however, will result in implausible results after a few years. In order to escape this

¹ Source: Cartter [1975], p. 140, Table 7-3, Alternative II.

dilemma, we use the following parametric approach of asymptotically adjusted extrapolation of linear trends:

Let x_t , $t = 1, \dots, T$ be the empirical values of the coefficient time series to be extrapolated. In a first step the trend coefficient b is evaluated by minimizing

$$(22) \quad Z = \sum_{t=1}^T \alpha^{T-t} [a + bt - x_t]^2$$

where $(0 < \alpha \leq 1)$ is a weighting parameter which assigns, if less than 1, the highest weight to the latest empirical data and exponentially decreasing weights to the remaining data, retrospectively.

In a second step b and two additional parameters k and m are used for specifying the extrapolation equations

$$(23) \quad x_{T+r} = x_T + \frac{2mb}{k+1} \sum_{i=0}^{r-1} \left(1 - \frac{i}{k}\right), \quad r = 1, 2, \dots, k$$

and

$$(24) \quad x_{T+k+s} = x_{T+k} = x_T + mb, \quad s = 1, 2, \dots$$

The extrapolation values resulting from equations (23) and (24) form an asymptotic curve which, starting at level x_T , approaches within k years the level $x_T + mb$ and remains at this level thereafter.

In order to define a concrete extrapolation, the three parameters α , k , and m must be numerically specified. The first parameter α indicates an assumption about the influence distribution of periods of different

distance from the present on the trend coefficient b . Specifying k and m represents suppositions about length and strength of future trend effectiveness.

Because we are first of all interested in the developments in the near future, all alternatives to be used assume a period of $k = 6$ years from the last year of empirical data to the year of asymptotic levelling. As to the other parameters, a number of different combinations were tested, from which the following three representatives were chosen:

Alternative A: $\alpha = 1$, $k = 6$, $m = 2$

B: $\alpha = .5$, $k = 6$, $m = 2$

C: $\alpha = 1$, $k = 6$, $m = 2.5$

4.2 FGE Projections

All projections were conducted at the disaggregated (19-fields) level. For the sake of lucidity, however, the main results are presented at the semi-aggregated, seven-group-level. The original, completely disaggregated results are shown in Tables A1-C6 of the appendix to this paper.

Table 18 contains the projections of FGE percentages, viz., choice coefficients for the three alternatives and all years between 1973 and 1980; because of the asymptotic adjustment the values don't change after that.

As could be expected on grounds of the clear trends between 1969 and 1974 (see Table 10), all projections reveal the same basic pattern. The professionally oriented fields of Groups I and II continue gaining considerably in popularity. Education, Agriculture and Biological Sciences (Groups III and IV) experience increasing FGE shares, too, but to a comparatively smaller extent.

Table 18: FGE Percentage Projection Alternatives, Semi-Aggregated

Group	Fields Contained	Alternative	Years 1973*	1974*	1975	1976	1977	1978	1979	1980
I	ARCH,BUSN, COMM,CPSC	A			17.1	17.3	17.6	17.7	17.9	17.9
		B	15.1	16.8	17.1	17.5	17.8	18.0	18.1	18.2
		C			17.1	17.5	17.8	18.0	18.1	18.2
II	HLTH,PROF, PSYC,PUBL	A			14.6	15.1	15.5	15.8	16.0	16.1
		B	13.3	14.1	14.6	15.0	15.3	15.6	15.8	15.9
		C			14.8	15.4	15.8	16.2	16.4	16.6
III	AGRC,BIOL	A			4.6	4.7	4.7	4.7	4.8	4.8
		B	4.4	4.6	4.6	4.6	4.7	4.7	4.7	4.7
		C			4.6	4.7	4.7	4.8	4.8	4.8
IV	EDUC	A			37.8	38.0	38.1	38.2	38.2	38.3
		B	38.4	37.6	37.8	38.0	38.2	38.3	38.3	38.4
		C			37.8	38.0	38.2	38.3	38.4	38.4
V	ENGN,MATH,PHYS	A			8.7	8.2	7.9	7.6	7.4	7.3
		B	9.4	9.2	8.8	8.4	8.2	7.9	7.8	7.7
		C			8.5	8.0	7.5	7.2	7.0	6.9
VI	ARTS,LITR,SOCS	A			15.1	14.6	14.3	14.1	14.0	13.8
		B	16.8	15.5	15.0	14.5	14.1	13.8	13.6	13.5
		C			15.0	14.4	14.0	13.7	13.5	13.4
VII	LAW,OTHR	A			2.2	2.1	2.0	1.9	1.8	1.8
		B	2.5	2.4	2.2	2.0	1.8	1.7	1.7	1.6
		C			2.2	2.0	1.9	1.8	1.7	1.7
I + II		A			31.7	32.4	33.1	33.5	33.9	34.0
		B	28.4	30.9	31.7	32.5	33.1	33.6	33.9	34.1
		C			31.9	32.9	33.6	34.2	34.5	34.8
III + IV		A			42.4	42.7	42.8	42.9	43.0	43.1
		B	42.8	42.2	42.4	42.6	42.9	43.0	43.0	43.1
		C			42.2	42.7	42.9	43.1	43.2	43.2
V + VI		A			23.8	22.8	22.2	21.7	21.4	21.1
		B	26.2	24.7	23.8	22.9	22.3	21.7	21.4	21.2
		C			23.5	22.4	21.5	20.9	20.5	20.3

* actual

Against this, the choice coefficients decline even further in the research and academically oriented fields of Groups V and VI.

By the definition of m it is obvious that variant C shows generally stronger trend effects than alternative A. The differences are, however, rather small. The maximal relative difference is 5.5 percent, as shown in 1980 in Group V. It represents an absolute difference of about 2,500 enrollees in the EMP-fields.

Comparing the variants A and B, we find uneven differences. The decreasing influence of earlier data in alternative B, as expressed by $\alpha = .5$, causes strengthening of trends in Groups I, IV, VI, and VII, but weakening of trends in the other groups. Again, the differences are small. Measured relative to the percentages of variant A, and under exclusion of Group VII, the maximal difference is again 5.5 percent.

The general development of first year graduate enrollment, as it results from the basic assumptions (i) and (ii), is clear. Transferred into absolute enrollment numbers, this development is displayed in Table 19, which contains the semi-aggregated enrollment projection according to variant A.

4.3 Degree Projections

Before inquiring into the degree projections at the disaggregated level, let us compare the projections resulting from the alternative extrapolation methods at the totally aggregated level. Tables 20 and 21 display the respective figures of M.A.'s and Ph.D.'s for all odd years between 1973 and 1989. Each of the first three rows in both tables results from applying the same extrapolation method to the choice coefficients, as well as to the

Table 19: FGE Projection Alternative A, Semi-Aggregated (in thousands)

Group	Fields Contained	Years												
		1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985	1987	1989
I	ARCH,BUSN,COMM,CPSC	85	100	104	107	111	115	114	111	106	98	100	117	110
II	HLTH,PSYC,PUBL,PROF	75	84	90	93	97	102	101	99	95	87	90	105	99
III	AGRC,BIOL	25	27	28	29	30	30	30	29	28	26	27	31	30
IV	EDUC	216	225	231	235	240	247	243	237	226	209	214	250	236
V	ENGN,MATH,PHYS	53	55	53	51	50	49	47	46	43	40	41	48	45
VI	ARTS,LITR,SOC	94	93	92	90	90	91	89	86	82	75	77	90	85
VII	LAW,OTHR	14	14	14	13	12	12	12	11	10	10	10	12	11
I + II		160	184	194	200	208	217	215	210	201	185	190	222	209
III + IV		241	252	259	264	270	277	273	266	254	235	241	281	266
V + VI		147	148	145	141	140	140	136	132	125	115	118	138	130
Total		562	598	612	618	630	646	636	619	590	545	559	653	616

completion coefficients. The projections were conducted at the 19-field level and then aggregated by summing up corresponding values.

The differences resulting from the use of distinct extrapolation methods are again very small. In the case of M.A.'s, they are, relatively measured, generally less than 1 percent between A and B, and well below 2 percent between A and C. The maximal relative deviations between corresponding Ph.D. projection values are 3.9 percent (namely, between A and B from 1985 on).

It is interesting that in the case of Ph.D.'s, the lowest projections result from variant B. This indicates that the most recent changes in completion behaviour, if continuing, will result in considerably smaller numbers of Ph.D.'s than so far predicted. One factor of plausibility for this development follows from the assumption that the students' decision to complete a certain degree is in principle already made at the beginning of study, together with the enrollment decision. Considering this, only the most recent actual Ph.D. completion coefficients reflect decisions made after the job prospects worsened at the end of the 1960s. Therefore, it appears plausible throughout that the decreased growth of graduate enrollment will in the near future be accompanied by stronger declines in completion coefficients as well.

All of the first three projections are for all years considerably lower than the Cartter projection in the fourth row. The relative difference rises up to 16 percent (between variant B and the Cartter projection). This is not surprising. The last actual Ph.D. completion coefficient available to Cartter was 7.6 percent in 1972. His extrapolation, though following a rather strong downward trend, reaches the actual value of 1973, viz. 6.9 percent, not before 1975, and stays at about this level for several years before further declining. (cf. Cartter [1975], p. 143.)

Table 20: Ph.D. Projection Alternatives, Aggregated

Alternative	1973	1975	1977	1979	1981	1983	1985	1987	1989
A ($\alpha=1, k=6, m=2$)	33,826*	34,850	35,347	36,831	37,852	37,819	35,328	33,023	33,996
B ($\alpha=.5, k=6, m=2$)	33,826*	34,324	34,437	35,624	36,475	36,367	33,952	31,737	32,672
C ($\alpha=1, k=6, m=2.5$)	33,826*	34,532	34,828	36,175	37,101	37,036	34,587	32,331	33,284
Cartter II	34,400	35,600	37,400	40,600	42,800	43,100	40,200	34,800	35,500

Table 21: M.A. Projection Alternatives, Aggregated

Alternative	1973	1975	1977	1979	1981	1983	1985	1987	1989
A ($\alpha=1, k=6, m=2$)	278,259*	314,963	341,474	358,435	353,585	326,661	308,059	327,788	366,120
B ($\alpha=.5, k=6, m=2$)	278,259*	314,296	339,947	356,374	351,468	324,696	306,206	325,817	363,917
C ($\alpha=1, k=6, m=2.5$)	278,259*	316,635	344,981	363,178	358,536	331,267	312,403	332,411	371,282

* actual

In principle, the dynamic development of all projections in Tables 20 and 21 is determined by the underlying FGE projection (Table 17), which is increasing until 1978, decreasing between 1978 and 1983, and shows another peak between 1983 and 1989. Because of the time lag between enrollment and degree completion, the degree projections are shifted to the right (by 1.5 and 4 years for M.A.'s and Ph.D.'s, respectively). Besides, the general trends in completion behaviour cause a vertical shifting as well. It is upward in the case of M.A.'s, but downward for Ph.D.'s. Between 1973 and 1979, for example, total FGE increases by 13 percent. Using the projection values of variant B, we find an increase of Ph.D.'s between 1977 and 1983 of only 7 percent, whereas the average M.A. numbers between 1974-75 and 1980-81 grow by 17 percent.

Concluding the projection analysis, Tables 22 and 23 contain for Ph.D.'s and M.A.'s, respectively, the absolute and percentage projections at the semi-aggregated level, as resulting from extrapolation method A. They clearly reveal the dynamics of the graduate sector of higher education. As to be expected, the shiftings are stronger in the case of Ph.D.'s.

Until 1971, more than half of all Ph.D.'s awarded were degrees in the EMP fields, arts, letters, and social sciences. Steadily decreasing graduate enrollment as well as declining Ph.D. completion coefficients, however, produce a change to the extent that after 1983 less than one-third of all Ph.D.'s are awarded in these fields.

Against this, the professionally oriented fields of Groups I and II, where only 13 percent of all Ph.D.'s were awarded in 1971, increase their share to nearly 28 percent in 1983 and later years. The gain is caused by above average enrollment growth and only slightly decreasing (Group I) or even increasing completion coefficients.

Table 22: Ph.D. Projection Alternative A, Semi-Aggregated, Absolute and Percentage Values

Group	Fields Contained		Years 1973*	1975	1977	1979	1981	1983	1985	1987	1989
I	ARCH,BUSN, COMM,CPSC	abs %	1,425 4.2	1,637 4.7	1,820 5.1	2,110 5.7	2,263 6.0	2,313 6.1	2,175 6.2	2,033 6.2	2,093 6.2
II	HLTH,PSYC, PUBL,PROF	abs %	4,111 12.1	5,244 15.0	6,350 18.0	7,262 19.7	7,863 20.8	8,078 21.4	7,603 21.5	7,107 21.5	7,317 21.5
III	AGRC,BIOL	abs %	4,370 12.9	4,895 14.0	5,273 14.9	5,757 15.6	6,090 16.1	6,180 16.3	5,798 16.4	5,420 16.4	5,579 16.4
IV	EDUC	abs %	7,293 21.6	7,279 20.9	7,682 21.7	8,160 22.2	8,521 22.5	8,588 22.7	8,041 22.8	7,517 22.8	7,738 22.8
V	ENGN,MATH, PHYS	abs %	7,974 23.6	6,922 19.9	5,998 17.0	5,704 15.5	5,407 14.3	5,150 13.6	4,746 13.4	4,436 13.4	4,567 13.4
VI	ARTS,LITR, SOCS	abs %	8,430 24.9	8,629 24.8	8,022 22.7	7,661 20.8	7,545 19.9	7,357 19.5	6,825 19.3	6,380 19.3	6,568 19.3
VII	LAW,OTHR	abs %	223 .7	245 .7	203 .6	177 .5	163 .4	152 .4	140 .4	130 .4	134 .4
I + II		abs %	5,536 16.3	6,917 19.7	8,170 23.1	9,372 25.4	10,126 26.8	10,391 27.5	9,778 27.7	9,140 27.7	9,410 27.7
III + IV		abs %	11,663 34.5	12,174 34.9	12,955 36.6	13,917 37.8	14,611 38.6	14,768 39.0	13,839 39.2	12,937 39.2	13,317 39.2
V + VI		abs %	16,404 48.5	15,551 44.7	14,020 39.7	13,365 36.3	12,952 34.2	12,507 33.1	11,571 32.7	10,816 32.7	11,135 32.7
Total		abs %	33,826 100.0	34,850 100.0	35,347 100.0	36,831 100.0	37,852 100.0	37,819 100.0	35,328 100.0	33,023 100.0	33,996 100.0

* actual

Table 23: M.A. Projection Alternative a, Semi-Aggregated, Absolute and Percentage Values

Group	Fields Contained		Years 1973*	1975	1977	1979	1981	1983	1985	1987	1989
I	ARCH,BUSN, COMM,CPSC	abs %	40,471 14.5	47,577 15.1	54,703 16.0	58,428 16.3	58,236 16.5	53,872 16.5	50,804 16.5	54,058 16.5	60,380 16.5
II	HLTH,PSYC, PUBL,PROF	abs %	41,976 15.1	53,433 17.0	62,696 18.4	69,066 19.2	69,610 19.7	64,490 19.7	60,817 19.7	64,712 19.7	72,280 19.7
III	AGRC,BIOL	abs %	9,520 3.4	10,096 3.2	10,995 3.2	11,557 3.2	11,478 3.2	10,613 3.2	10,009 3.2	10,650 3.2	11,895 3.2
IV	EDUC	abs %	112,739 40.5	133,705 42.5	144,981 42.5	153,011 42.7	150,998 42.7	139,507 42.7	131,563 42.7	139,989 42.7	156,359 42.7
V	ENGN,MATH PHYS	abs %	26,312 9.5	25,698 8.2	25,155 7.4	24,103 6.7	22,653 6.4	20,796 6.4	19,612 6.4	20,868 6.4	23,308 6.4
VI	ARTS,LITR, SOCS	abs %	42,596 15.3	40,280 12.8	38,866 11.4	38,381 10.7	36,909 10.4	33,986 10.4	32,051 10.4	34,103 10.4	38,091 10.4
VII	LAW,OTHR	abs %	4,645 1.7	4,174 1.3	4,078 1.2	3,949 1.1	3,701 1.0	3,397 1.0	3,203 1.0	3,408 1.0	3,807 1.0
I + II		abs %	82,447 29.6	101,010 32.1	117,399 34.4	127,434 35.5	127,846 36.2	118,362 36.2	111,621 36.2	118,770 36.2	132,660 36.2
III + IV		abs %	122,259 43.9	143,801 45.7	155,976 45.7	164,568 45.9	162,476 45.9	150,120 45.9	141,572 45.9	150,639 45.9	168,254 45.9
V + VI		abs %	68,908 24.8	65,978 21.0	64,021 18.8	62,484 17.4	59,562 16.8	54,782 16.8	51,663 16.8	54,971 16.8	61,399 16.8
Total		abs %	278,295 100.0	314,963 100.1	341,474 100.1	358,435 99.9	353,585 99.9	326,661 99.9	308,059 99.9	327,788 99.9	366,120 99.9

* actual

In comparison with these strong shifts, the increase of the Ph.D. production shares for the fields of Groups III and IV is only moderate. Agriculture and biological sciences are small but Ph.D. intensive fields. Thus enrollment growth considerably above the average is not equalized by only slightly declining completion coefficients. In education, enrollment growth is only small, whereas the completion coefficients decline rather strongly. However, because more students enroll in education than in any other field, its share of total Ph.D. production is still increasing.

The field distribution of M.A. production shows in principle the same pattern of dynamic development. As a result of greater similarity in completion behaviour, however, the trends of enrollment shares have less effect upon M.A. production shares. Between 1973 and 1981 (because of the shorter time lag the asymptotic values are earlier reached) the added share of Groups I and II rises from 30 percent to 36 percent. Groups III and IV remain nearly stable (1973: 44 percent - 1981: 46 percent). Consequently, the percentage of M.A.'s awarded in the fields of Groups V and VI, decreases only from 25 percent in 1973 to 17 percent in 1981.

4.4 Conclusion

Like all projections resulting from trend extrapolations, the above figures ought to be judged very carefully. During the last years, every new Ph.D. projection turned out to be a downward correction of former ones. This indicates that student behaviour cannot satisfactorily be explained without taking into account the factors influencing student decisions.

However, the results of the foregoing simple comparative trend analysis show that, in order to explain student decisions, the models must be

disaggregated, not only with regard to their relations, but also with regard to the classification of the model variables. The disaggregated projections yield interesting findings if seen in the context of assumptions about decision influencing factors. On the one hand, they confirm hypotheses already raised in global models by, e.g., Cartter and Freeman. On the other hand, they show that these hypotheses, based on economic theories, are not sufficient to explain student behavior satisfactorily.

The steady decline of graduate enrollment in fields of higher degree production mainly for research and academic teaching is very well explained by student responsiveness to decreasing R & D spending and fewer academic job openings, respectively. The development in the EMP-fields is particularly supportive of Freeman's apprehension that the elasticity of supply could result in cobb-web cycles of the labor market for Ph.D.'s in these fields. The increase of enrollment and degree production in the professionally oriented fields, in contrast, might be due to the fact that there are more job possibilities outside the academic sector.

None of the market response assumptions, however, can sufficiently explain the developments in agriculture, biological sciences, and education, which together represent about 40 percent of graduate enrollment, and about 35 percent and 45 percent of all M.A.'s and Ph.D.'s, respectively, awarded. Though agriculture and biology are academically-oriented fields, graduate enrollment as well as Ph.D. production still increases, and though the job prospects for holders of higher degrees in education are generally bad, still more and more M.A.'s and Ph.D.'s of educational fields leave the universities. As a possible explanation for these findings we already mentioned students' concern about actual problems of their physical and social environment. This hypothesis is, of course, to be tested by means of a disaggregated model.

APPENDIX A: DISAGGREGATED PROJECTION RESULTS - ALTERNATIVE A

TABLE A1: FGE PERCENTAGE PROJECTION, ALTERNATIVE A, DISAGGREGATED

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	1.01	1.10	1.14	1.17	1.20	1.22	1.23	1.23
ARCH	0.88	0.93	0.98	1.01	1.04	1.06	1.08	1.09
BIOL	3.38	3.46	3.48	3.50	3.51	3.53	3.53	3.54
BUSN	12.39	13.76	14.00	14.20	14.35	14.47	14.55	14.59
COMM	0.90	0.95	1.00	1.03	1.06	1.08	1.10	1.11
CPSC	0.94	1.07	1.09	1.11	1.12	1.13	1.13	1.14
EDUC	38.38	37.60	37.80	37.96	38.09	38.18	38.25	38.28
ENGN	5.12	5.17	4.90	4.68	4.50	4.36	4.27	4.23
ARTS	3.03	2.89	2.82	2.76	2.71	2.68	2.65	2.64
HLTH	3.03	3.19	3.41	3.58	3.73	3.83	3.91	3.94
LAW	0.48	0.37	0.36	0.36	0.36	0.36	0.36	0.36
LTTR	6.19	5.74	5.58	5.44	5.33	5.25	5.19	5.17
MATH	1.73	1.59	1.45	1.33	1.23	1.16	1.12	1.09
PHYS	2.52	2.43	2.32	2.22	2.14	2.08	2.04	2.03
PSYC	2.89	2.89	2.93	2.97	3.00	3.03	3.04	3.05
PUBL	3.92	4.48	4.74	4.96	5.14	5.27	5.35	5.40
SOCS	7.58	6.90	6.66	6.45	6.28	6.15	6.08	6.03
PROF	3.50	3.47	3.52	3.57	3.61	3.64	3.65	3.66
OTHR	2.02	1.99	1.83	1.70	1.59	1.52	1.46	1.44
TOTL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

TABLE A2: FGE PROJECTION, ALTERNATIVE A, DISAGGREGATED
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	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	5686	6575	6968	7234	7536	7852	7812	7643
ARCH	4970	5564	5970	6257	6566	6876	6864	6727
BIOL	18991	20694	21317	21634	22142	22772	22464	21885
BUSN	69638	82265	85676	87729	90422	93480	92532	90302
COMM	5081	5689	6093	6379	6687	6998	6982	6841
CPSC	5279	6392	6664	6830	7045	7287	7216	7043
EDUC	215653	224751	231313	234575	239942	246660	243251	236948
ENGN	28763	30914	30006	28913	28344	28194	27186	26182
ARTS	17012	17303	17272	17067	17093	17293	16871	16345
HLTH	17037	19078	20846	22154	23485	24773	24844	24401
LAW	2703	2189	2227	2236	2270	2320	2279	2215
LTTR	34763	34306	34124	33615	33579	33903	33030	31979
MATH	9746	9493	8853	8210	7775	7515	7098	6762
PHYS	14693	14543	14178	13717	13493	13460	13004	12536
PSYC	16219	17270	17960	18369	18916	19543	19336	18866
PUBL	22013	26793	29033	30663	32355	34020	34048	33407
SOC	42608	41262	40729	39849	39579	39781	38639	37350
PROF	19665	20723	21563	22054	22729	23487	23243	22680
OTHR	11340	11891	11208	10503	10043	9787	9300	8889
TOTL	561860	597695	612000	618000	630000	646000	636000	619000

TABLE A2 (CONTINUED)
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	1981	1982	1983	1984	1985	1986	1987	1988	1989
AGRC	7285	7025	6729	6766	6902	7458	8063	7976	7606
ARCH	6411	6183	5922	5955	6075	6564	7096	7020	6694
BIOL	20859	20117	19269	19375	19763	21354	23087	22839	21779
BUSN	86072	83008	79507	79944	81549	88114	95262	94241	89865
COMM	6521	6288	6023	6056	6178	6675	7217	7139	6808
CPSC	6713	6474	6201	6235	6360	6872	7430	7350	7009
EDUC	225847	217809	208622	209770	213981	231206	249963	247284	235800
ENGN	24955	24067	23052	23179	23644	25547	27620	27324	26055
ARTS	15579	15025	14391	14470	14761	15949	17243	17058	16266
HLTH	23258	22430	21484	21602	22036	23810	25741	25465	24283
LAW	2112	2037	1951	1961	2001	2162	2337	2312	2205
LTTR	30480	29395	28156	28311	28879	31204	33735	33373	31824
MATH	6445	6216	5954	5986	6107	6598	7133	7057	6729
PHYS	11949	11524	11038	11098	11321	12233	13225	13083	12476
PSYC	17982	17342	16611	16702	17037	18409	19902	19689	18775
PUBL	31842	30708	29413	29575	30169	32597	35242	34864	33245
SOC	35600	34333	32885	33066	33729	36445	39401	38979	37169
PROF	21617	20848	19968	20078	20481	22130	23925	23669	22570
OTHR	8472	8171	7826	7869	8027	8673	9377	9276	8845
TOTL	590000	569000	545000	548000	559000	604000	653000	646000	616000

TABLE A3: PH.D. COMPL. COEFF. PROJECTION, ALT. A, DISAGGR. (IN PERCENT.)

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	24.59	24.25	23.96	23.73	23.55	23.44	23.38	23.38
ARCH	2.52	2.57	2.62	2.65	2.68	2.69	2.70	2.70
BIOL	21.32	20.80	20.37	20.02	19.76	19.59	19.50	19.50
BUSN	1.76	1.77	1.78	1.79	1.80	1.80	1.80	1.80
COMM	5.90	5.77	5.66	5.57	5.50	5.46	5.44	5.44
CPSC	5.05	3.99	3.09	2.37	1.83	1.47	1.29	1.29
EDUC	4.03	3.89	3.78	3.68	3.61	3.57	3.54	3.54
ENGN	9.33	9.00	8.73	8.52	8.35	8.25	8.19	8.19
ARTS	3.36	2.98	2.67	2.42	2.23	2.10	2.04	2.04
HLTH	7.56	7.70	7.82	7.91	7.98	8.03	8.05	8.05
LAW	1.20	1.19	1.19	1.18	1.18	1.18	1.18	1.18
LTTR	10.05	10.16	10.24	10.30	10.35	10.39	10.40	10.40
MATH	7.61	7.27	6.99	6.76	6.59	6.48	6.42	6.42
PHYS	21.37	20.68	20.11	19.65	19.31	19.08	18.95	18.95
PSYC	18.91	18.74	18.61	18.50	18.41	18.36	18.33	18.33
PUBL	2.03	2.08	2.13	2.16	2.19	2.21	2.22	2.22
SOC	9.77	9.63	9.52	9.43	9.36	9.31	9.29	9.29
PROF	6.25	6.70	7.08	7.38	7.61	7.76	7.84	7.84
OTHR	1.26	1.28	1.30	1.32	1.33	1.34	1.35	1.35
TOTL	6.85	6.62	6.42	6.26	6.14	6.06	6.02	6.02

TABLE A4: M.A. COMPL. COEFF. PROJECTION, ALT. A, DISAGGR. (IN PERCENT.)

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	53.72	53.02	52.43	51.96	51.61	51.37	51.25	51.25
ARCH	70.63	70.43	70.27	70.14	70.04	69.97	69.94	69.94
BIOL	35.54	35.07	34.68	34.37	34.14	33.98	33.90	33.90
BUSN	49.36	49.84	50.24	50.56	50.80	50.96	51.04	51.04
COMM	63.18	62.43	61.81	61.31	60.94	60.69	60.57	60.57
CPSC	45.31	42.94	40.97	39.39	38.21	37.42	37.02	37.02
EDUC	58.33	59.63	60.72	61.59	62.24	62.67	62.89	62.89
ENGN	52.11	53.07	53.87	54.51	54.99	55.31	55.47	55.47
ARTS	52.53	52.99	53.38	53.69	53.92	54.07	54.15	54.15
HLTH	70.07	70.12	70.16	70.20	70.22	70.24	70.25	70.25
LAW	50.18	51.80	53.16	54.24	55.05	55.59	55.86	55.86
LTTR	42.41	41.80	41.29	40.88	40.57	40.36	40.26	40.26
MATH	41.62	41.56	41.51	41.47	41.44	41.42	41.40	41.40
PHYS	37.97	38.27	38.52	38.71	38.86	38.96	39.01	39.01
PSYC	43.48	44.02	44.47	44.83	45.10	45.28	45.37	45.37
PUBL	72.22	74.06	75.60	76.83	77.75	78.36	78.67	78.67
SOC	41.52	40.81	40.21	39.74	39.38	39.15	39.03	39.03
PROF	72.65	73.19	73.64	73.99	74.26	74.44	74.53	74.53
OTHR	22.37	23.66	24.74	25.60	26.25	26.68	26.90	26.90
TOTL	52.10	52.77	53.33	53.77	54.11	54.33	54.44	54.44

TABLE A5: PH.D. PROJECTION, ALTERNATIVE A, DISAGGREGATED

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	930	1073	1210	1315	1407	1502	1619	1694
ARCH	69	82	96	112	132	148	160	169
BIOL	3440	3576	3686	3739	3866	3984	4138	4232
BUSN	983	1086	1156	1209	1308	1425	1535	1584
COMM	175	201	229	250	278	307	329	347
CPSC	199	186	155	121	102	90	86	88
EDUC	7293	7290	7279	7394	7682	7988	8160	8340
ENGN	3312	3080	2751	2493	2456	2465	2453	2383
ARTS	585	503	437	382	373	361	351	349
HLTH	578	732	940	1183	1362	1525	1667	1785
LAW	27	26	27	29	29	28	26	26
LTTR	3556	3763	3859	3811	3677	3573	3539	3513
MATH	1031	954	859	744	670	607	569	532
PHYS	3631	3503	3312	3062	2872	2761	2682	2616
PSYC	2339	2575	2772	2876	3018	3148	3275	3376
PUBL	230	279	337	412	494	573	639	680
SOC	4289	4411	4332	4129	3973	3867	3772	3720
PROF	964	1081	1194	1360	1477	1602	1681	1733
OTHR	196	210	218	186	173	154	151	143
TOTL	33826	34613	34850	34808	35347	36108	36831	37311

TABLE A5 (CONTINUED)

	1981	1982	1983	1984	1985	1986	1987	1988	1989
AGRC	1763	1808	1917	1772	1711	1640	1599	1590	1647
ARCH	177	183	184	180	174	167	163	162	167
BIOL	4326	4380	4364	4239	4087	3917	3820	3797	3933
BUSN	1631	1660	1659	1615	1558	1493	1455	1447	1499
COMM	364	374	377	369	356	341	333	331	343
CPSC	91	93	93	90	87	83	81	81	84
EDUC	8521	8623	8588	8342	8042	7707	7517	7472	7738
ENGN	2333	2286	2227	2139	2054	1968	1920	1908	1976
ARTS	349	348	343	331	319	305	298	296	307
HLTH	1890	1963	1987	1947	1882	1803	1759	1748	1811
LAW	27	27	27	26	25	24	23	23	24
LTTR	3506	3485	3430	3311	3185	3053	2977	2959	3055
MATH	503	479	458	435	416	399	389	386	400
PHYS	2571	2526	2465	2370	2276	2181	2127	2115	2190
PSYC	3472	3531	3528	3433	3311	3173	3095	3076	3186
PUBL	717	742	750	734	709	680	663	659	682
SOC	3691	3653	3584	3455	3321	3183	3105	3086	3196
PROF	1783	1814	1813	1764	1701	1631	1590	1581	1637
OTHR	136	131	126	120	115	110	107	106	110
TOTL	37852	39108	37819	36671	35328	33857	33023	32824	33996

TABLE A5: M.A. PROJECTION, ALTERNATIVE A, DISAGGREGATED

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	2939	3007	3214	3518	3665	3794	3944	4014
ARCH	2733	3238	3701	4045	4282	4486	4701	4805
BIOL	6581	6661	6882	7219	7331	7437	7613	7668
BUSN	32820	33948	38157	42454	44044	45392	46931	47469
COMM	2642	2952	3328	3612	3800	3965	4144	4234
CPSC	2276	2234	2391	2571	2578	2596	2653	2685
EDUC	112739	123117	133705	140439	144981	148696	153011	154052
ENGN	15385	15196	16075	16604	16200	15835	15681	15360
ARTS	8001	8730	9158	9281	9258	9236	9310	9250
HLTH	9741	11255	12670	14013	15098	16028	16950	17428
LAW	1181	1359	1300	1198	1228	1252	1282	1284
LTTR	16155	15094	14258	13986	13740	13561	13585	13474
MATH	4840	4365	3993	3804	3535	3310	3165	3025
PHYS	6087	5757	5630	5559	5420	5300	5257	5161
PSYC	6616	7020	7446	7897	8192	8441	8724	8819
PUBL	12694	15115	18448	21444	23206	24691	26109	26775
SOC	18439	17572	16854	16292	15967	15547	15486	15303
PROF	12925	13724	14870	15644	16199	16672	17223	17414
OTH	3464	3207	2874	2957	2850	2741	2667	2567
TOTL	278259	293551	314963	332538	341474	348982	358435	360787

TABLE A5 (CONTINUED)

	1981	1982	1983	1984	1985	1986	1987	1988	1989
AGRC	3961	3826	3667	3525	3458	3503	3680	3977	4110
ARCH	4753	4594	4404	4233	4154	4207	4420	4777	4936
BIOL	7517	7246	6946	6676	6550	6634	6970	7533	7785
BUSN	46658	45010	43148	41473	40691	41212	43297	46797	48360
COMM	4186	4046	3879	3728	3658	3705	3892	4207	4347
CPSC	2639	2546	2441	2346	2302	2331	2449	2647	2736
EDUC	150998	145526	139507	134091	131563	133248	139989	151303	156359
ENGN	14802	14183	13597	13069	12822	12987	13644	14746	15239
ARTS	8993	8643	8286	7964	7814	7914	8315	8987	9287
HLTH	17297	16740	16048	15425	15134	15328	16103	17405	17986
LAW	1255	1209	1159	1114	1093	1107	1163	1257	1299
LTTR	13087	12573	12053	11585	11367	11513	12095	13073	13509
MATH	2869	2734	2621	2519	2472	2504	2630	2843	2938
PHYS	4981	4775	4578	4400	4317	4373	4544	4965	5131
PSYC	8666	8359	8013	7702	7557	7653	8041	8690	8981
PUBL	26533	25666	24604	23649	23203	23500	24689	26685	27576
SOC	14828	14235	13647	13117	12870	13034	13694	14801	15295
PROF	17113	16508	15825	15210	14924	15115	15879	17163	17736
OTH	2446	2335	2238	2151	2111	2138	2246	2427	2508
TOTL	353585	340753	326661	313978	308059	312005	327788	354282	366120

APPENDIX B: DISAGGREGATED PROJECTION RESULTS - ALTERNATIVE B

TABLE B1: FGE PERCENTAGE PROJECTION, ALTERNATIVE B, DISAGGREGATED

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	1.01	1.10	1.13	1.15	1.17	1.19	1.20	1.20
ARCH	0.88	0.93	0.98	1.01	1.04	1.06	1.08	1.09
BIOL	3.38	3.46	3.47	3.48	3.49	3.50	3.50	3.51
BUSN	12.39	13.76	14.07	14.32	14.53	14.68	14.78	14.83
COMM	0.90	0.95	0.99	1.02	1.05	1.07	1.08	1.09
CPSC	0.94	1.07	1.10	1.12	1.14	1.15	1.16	1.16
EDUC	38.38	37.60	37.83	38.01	38.16	38.27	38.35	38.39
ENGN	5.12	5.17	5.01	4.88	4.78	4.70	4.65	4.62
ARTS	3.03	2.89	2.86	2.82	2.80	2.78	2.77	2.75
HLTH	3.03	3.19	3.37	3.51	3.63	3.71	3.77	3.80
LAW	0.48	0.37	0.35	0.34	0.33	0.33	0.32	0.32
LTTR	6.19	5.74	5.50	5.29	5.13	5.01	4.93	4.89
MATH	1.73	1.59	1.45	1.34	1.25	1.18	1.13	1.11
PHYS	2.62	2.43	2.31	2.21	2.13	2.06	2.02	2.00
PSYC	2.89	2.89	2.91	2.93	2.95	2.96	2.97	2.97
PUBL	3.92	4.48	4.76	4.99	5.18	5.32	5.41	5.45
SOC	7.58	6.90	6.60	6.35	6.15	6.00	5.90	5.85
PROP	3.50	3.47	3.51	3.55	3.59	3.61	3.62	3.63
OTHR	2.02	1.99	1.80	1.64	1.51	1.42	1.35	1.32
TOTL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

TABLE B2: FGE PROJECTION, ALTERNATIVE B, DISAGGREGATED

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	5686	5575	5915	7136	7400	7685	7629	7455
ARCH	4970	5564	5970	6258	6567	6877	6865	6728
BIOL	18991	20694	21265	21536	22006	22605	22281	21698
BUSN	63639	82265	86105	88524	91528	94840	94020	91823
COMM	5081	5689	6064	6324	6611	6905	6881	6737
CPSC	5279	6392	6706	6908	7153	7420	7361	7191
EDUC	215653	224751	231498	234918	240418	247246	243892	237603
ENGN	28763	30914	30687	30175	30097	30352	29547	28594
ARTS	17012	17303	17481	17454	17631	17954	17594	17084
HLTH	17037	19078	20598	21696	22847	23989	23986	23524
LAW	2703	2189	2160	2112	2097	2108	2047	1978
LTTR	34763	34306	33634	32707	32318	32351	31333	30243
MATH	9746	9493	8887	8273	7861	7621	7215	6881
PHYS	14693	14543	14139	13645	13394	13338	12871	12400
PSYC	16219	17270	17823	18115	18563	19108	18851	18380
PUBL	22013	26793	29133	30848	32613	34338	34395	33762
SOC	42608	41262	40416	39259	38774	38791	37555	36242
PROP	19665	20723	21508	21962	22587	23313	23053	22485
OTHR	11340	11891	11010	10138	9535	9162	8616	8190
TOTL	561860	597695	612000	618000	630000	646000	636000	619000

TABLE B2 (CONTINUED)

	1981	1982	1983	1984	1985	1986	1987	1988	1989
AGRC	7106	5853	6564	6600	6733	7275	7865	7781	7420
ARCH	6413	6184	5924	5956	6076	6565	7097	7021	6695
BIOL	20682	19945	19104	19209	19595	21172	22890	22644	21593
BUSN	87521	84406	80845	81290	82922	89598	96866	95828	91378
COMM	6421	6193	5932	5964	6084	6574	7107	7031	6704
CPSC	6854	6611	6332	6367	6494	7017	7586	7505	7157
EDUC	226472	218411	209198	210350	214572	231846	250654	247967	236452
ENGN	27254	26284	25176	25314	25822	27901	30165	29841	28456
ARTS	16284	15704	15042	15124	15428	16670	18022	17829	17001
HLTH	22422	21624	20712	20826	21244	22954	24816	24550	23410
LAW	1896	1819	1742	1751	1787	1930	2087	2065	1969
LTTR	28827	27801	26628	26775	27312	29511	31905	31563	30097
MATH	6559	6325	6059	6092	6214	6714	7259	7181	6848
PHYS	11919	11399	10918	10978	11198	12100	13081	12941	12340
PSYC	17519	16895	16183	16272	16599	17935	19390	19182	18291
PUBL	32180	31035	29726	29889	30489	32944	35616	35234	33598
SOC	34544	33315	31909	32085	32729	35364	38233	37823	36056
PROP	21432	20669	19797	19906	20306	21940	23720	23466	22376
OTHR	7806	7528	7211	7250	7396	7991	8640	8547	8150
TOTL	590000	569000	545000	548000	559000	604000	653000	646000	616000

TABLE B3: PH.D. COMPL. COEFF. PROJECTION, ALT. B, DISAGGR. (IN PERCENT.)

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	24.59	23.44	22.48	21.71	21.13	20.75	20.56	20.56
ARCH	2.52	2.55	2.58	2.60	2.62	2.63	2.63	2.63
BIOL	21.32	20.53	19.98	19.36	18.96	18.70	18.57	18.57
BUSN	1.76	1.74	1.72	1.71	1.70	1.69	1.68	1.68
COMM	5.90	5.97	6.02	6.07	6.10	6.12	6.14	6.14
CPSC	5.06	4.08	3.27	2.62	2.13	1.80	1.64	1.64
EDUC	4.03	3.87	3.74	3.63	3.55	3.50	3.47	3.47
ENGN	9.33	8.96	8.65	8.41	8.22	8.10	8.04	8.04
ARTS	3.36	3.08	2.85	2.66	2.52	2.43	2.38	2.38
HLTH	7.56	7.52	7.49	7.47	7.45	7.44	7.43	7.43
LAW	1.20	1.14	1.09	1.05	1.02	1.00	0.99	0.99
LTTR	10.06	10.00	9.95	9.91	9.88	9.86	9.85	9.85
MATH	7.61	7.29	7.03	6.82	6.67	6.56	6.51	6.51
PHYS	21.37	20.55	19.86	19.31	18.90	18.62	18.49	18.49
PSYC	18.91	18.78	18.68	18.59	18.53	18.49	18.47	18.47
PUBL	2.03	2.04	2.04	2.05	2.05	2.05	2.06	2.06
SOCs	9.77	9.55	9.36	9.22	9.11	9.03	9.00	9.00
PROF	6.25	6.71	7.09	7.40	7.62	7.78	7.85	7.85
OTHR	1.26	1.23	1.20	1.18	1.17	1.16	1.16	1.16
TOTL	6.85	6.57	6.34	6.15	6.01	5.92	5.87	5.87

TABLE B4: M.A. COMPL. COEFF. PROJECTION, ALT. B, DISAGGR. (IN PERCENT.)

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	53.72	51.54	49.72	48.27	47.18	46.45	46.08	46.08
ARCH	70.63	71.34	71.93	72.40	72.75	72.99	73.11	73.11
BIOL	35.54	35.22	34.95	34.74	34.58	34.48	34.42	34.42
BUSN	49.36	49.37	49.38	49.39	49.40	49.40	49.41	49.41
COMM	63.18	62.13	61.26	60.56	60.04	59.69	59.52	59.52
CPSC	45.31	44.46	43.74	43.17	42.75	42.46	42.32	42.32
EDUC	58.33	59.80	61.03	62.01	62.75	63.24	63.49	63.49
ENGN	52.11	53.24	54.17	54.92	55.48	55.86	56.04	56.04
ARTS	52.53	54.47	56.09	57.38	58.35	59.00	59.32	59.32
HLTH	70.07	67.74	65.80	64.25	63.09	62.31	61.93	61.93
LAW	50.18	51.97	53.47	54.66	55.56	56.16	56.45	56.45
LTTR	42.41	41.32	40.41	39.68	39.13	38.77	38.59	38.59
MATH	41.62	42.11	42.51	42.83	43.07	43.24	43.32	43.32
PHYS	37.97	38.25	38.47	38.65	38.79	38.88	38.92	38.92
PSYC	43.48	44.33	45.03	45.59	46.01	46.30	46.44	46.44
PUBL	72.22	72.15	72.10	72.06	72.03	72.01	72.00	72.00
SOCs	41.52	41.41	41.31	41.24	41.18	41.14	41.12	41.12
PROF	72.65	72.54	72.45	72.38	72.33	72.29	72.28	72.28
OTHR	22.37	24.42	26.13	27.50	28.52	29.21	29.55	29.55
TOTL	52.10	52.87	53.50	54.01	54.39	54.65	54.77	54.77

TABLE B5: PH.D. PROJECTION, ALTERNATIVE B, DISAGGREGATED

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	930	1038	1135	1203	1262	1326	1413	1470
ARCH	69	82	95	110	129	145	156	165
BIOL	3440	3530	3597	3615	3709	3799	3930	4012
BUSN	993	1066	1117	1153	1235	1340	1443	1495
COMM	175	209	244	272	308	344	370	399
CPSC	198	191	164	134	119	110	109	113
EDUC	7293	7250	7202	7285	7544	7829	7992	8173
ENGN	3312	3065	2726	2461	2417	2440	2459	2437
ARTS	585	520	467	421	422	419	414	417
HLTH	578	716	901	1116	1271	1406	1520	1613
LAW	27	25	25	26	25	24	21	21
LTTR	3556	3705	3750	3665	3508	3375	3304	3239
MATH	1031	957	864	751	678	515	578	543
PHYS	3631	3480	3271	3009	2812	2693	2608	2538
PSYC	2339	2581	2783	2891	3037	3162	3275	3355
PUBL	230	272	323	390	463	534	595	635
SOC	4289	4373	4263	4038	3867	3742	3627	3552
PROP	964	1082	1196	1362	1480	1605	1681	1729
OTHR	196	201	201	167	152	132	127	118
TOTL	33926	34329	34324	34070	34437	35039	35624	35013

TABLE B5 (CONTINUED)

	1981	1982	1983	1984	1985	1986	1987	1988	1989
AGRC	1523	1556	1560	1521	1467	1406	1372	1363	1412
ARCH	173	178	180	176	170	163	159	158	163
BIOL	4095	4141	4122	4003	3858	3697	3606	3585	3713
BUSN	1544	1575	1576	1535	1481	1419	1384	1376	1425
COMM	406	417	420	410	396	379	370	368	381
CPSC	117	120	120	117	113	108	105	105	108
EDUC	8355	8459	8426	8186	7891	7563	7377	7332	7594
ENGN	2428	2412	2371	2288	2201	2109	2057	2045	2118
ARTS	421	422	417	404	389	373	364	362	374
HLTH	1697	1754	1771	1732	1673	1604	1564	1555	1610
LAW	21	21	20	20	19	18	18	17	18
LTTR	3197	3152	3084	2958	2852	2733	2666	2650	2744
MATH	516	493	471	448	429	411	401	399	413
PHYS	2488	2441	2379	2286	2195	2104	2052	2039	2112
PSYC	3434	3480	3469	3371	3250	3115	3038	3020	3127
PUBL	670	695	702	688	665	637	621	618	640
SOC	3504	3452	3376	3249	3122	2992	2918	2900	3004
PROP	1777	1805	1802	1753	1691	1620	1580	1571	1627
OTHR	111	105	100	95	91	87	85	84	87
TOTL	35475	36675	36367	35247	33952	32539	31737	31546	32672

TABLE B5: M.A. PROJECTION, ALTERNATIVE B, DISAGGREGATED
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	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	2939	2923	3048	3256	3314	3376	3476	3529
ARCH	2733	3279	3789	4175	4448	4680	4914	5023
BIOL	6581	6689	6936	7289	7401	7506	7679	7726
BUSN	32820	33630	37507	41581	43133	44476	46038	46654
COMM	2642	2938	3299	3559	3719	3861	4022	4102
CPSC	2276	2313	2553	2828	2910	2985	3084	3128
EDUC	112739	123459	134392	141467	146336	150301	154799	155901
ENGN	15385	15242	16164	16916	16884	16833	16939	16785
ARTS	8001	8973	9623	9980	10193	10350	10555	10544
HLTH	9741	10874	11882	12747	13341	13878	14502	14854
LAW	1181	1363	1308	1189	1187	1182	1187	1173
LTTR	16156	14921	13955	13480	12981	12605	12477	12287
MATH	4840	4423	4089	3936	3696	3488	3353	3213
PHYS	6087	5753	5624	5543	5389	5256	5203	5101
PSYC	6616	7059	7540	8000	8268	8490	8747	8916
PUBL	12694	14726	17596	20151	21603	22850	24103	24745
SOC	18439	17830	17325	16841	15407	16055	15949	15698
PROF	12925	13603	14531	15284	15721	16103	16587	16756
OTHR	3464	3309	3035	3149	3016	2873	2762	2627
TOTL	278259	293329	314296	331368	339947	347149	356374	358660

TABLE B5 (CONTINUED)
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	1981	1982	1983	1984	1985	1986	1987	1988	1989
AGRC	3476	3355	3217	3092	3033	3072	3228	3489	3605
ARCH	4969	4803	4605	4426	4342	4398	4520	4994	5161
BIOL	7570	7294	6993	6721	6595	6679	7017	7584	7837
BUSN	45908	44303	42471	40822	40052	40565	42617	46062	47501
COMM	4052	3916	3754	3608	3540	3585	3767	4071	4207
CPSC	3079	2972	2849	2738	2687	2721	2859	3090	3193
EDUC	152840	147310	141218	135735	133176	134882	141705	153159	158276
ENGN	16292	15650	15003	14420	14149	14330	15055	16271	16815
ARTS	10286	9897	9488	9119	8948	9062	9521	10290	10634
HLTH	14710	14226	13638	13108	12861	13026	13685	14791	15285
LAW	1135	1091	1046	1005	986	999	1049	1134	1172
LTTR	11881	11397	10926	10501	10303	10435	10963	11849	12245
MATH	3053	2911	2790	2682	2632	2665	2800	3026	3128
PHYS	4918	4714	4519	4343	4261	4316	4534	4901	5064
PSYC	9547	8335	7991	7680	7535	7632	8018	8666	8956
PUBL	24537	23740	22758	21875	21462	21737	22837	24683	25507
SOC	15174	14555	13953	13411	13159	13327	14001	15133	15639
PROF	16456	15871	15214	14624	14348	14532	15267	16501	17052
OTHR	2483	2363	2265	2178	2136	2164	2273	2457	2539
TOTL	351468	338704	324696	312089	306206	310128	325817	352151	363917

APPENDIX C: DISAGGREGATED PROJECTION RESULTS - ALTERNATIVE C

TABLE C1: FGE PERCENTAGE PROJECTION, ALTERNATIVE C, DISAGGREGATED

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	1.01	1.10	1.15	1.19	1.22	1.24	1.26	1.27
ARCH	0.88	0.93	0.99	1.03	1.07	1.10	1.12	1.13
BIOL	3.38	3.46	3.49	3.51	3.53	3.54	3.55	3.55
BUSN	12.39	13.76	14.06	14.30	14.50	14.65	14.75	14.79
COMM	0.90	0.95	1.01	1.05	1.09	1.12	1.13	1.14
CPSC	0.94	1.07	1.09	1.11	1.13	1.14	1.15	1.15
EDUC	38.39	37.60	37.84	38.05	38.21	38.33	38.41	38.45
ENGN	5.12	5.17	4.84	4.56	4.33	4.16	4.05	3.99
ARTS	3.03	2.89	2.80	2.73	2.67	2.62	2.59	2.58
HLTH	3.03	3.19	3.46	3.68	3.86	4.00	4.08	4.13
LAW	0.48	0.37	0.36	0.36	0.35	0.36	0.36	0.36
LTTR	6.19	5.74	5.53	5.36	5.23	5.13	5.06	5.02
MATH	1.73	1.59	1.41	1.26	1.15	1.06	1.00	0.97
PHYS	2.62	2.43	2.29	2.17	2.07	2.00	1.95	1.92
PSYC	2.89	2.89	2.95	2.99	3.03	3.06	3.08	3.09
PUBL	3.92	4.48	4.81	5.08	5.30	5.46	5.57	5.63
SOCS	7.58	6.90	6.59	6.33	6.13	5.97	5.87	5.82
PROP	3.50	3.47	3.54	3.60	3.64	3.68	3.70	3.71
OTHR	2.02	1.99	1.79	1.63	1.50	1.40	1.33	1.30
TOTL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

TABLE C2: FGE PROJECTION, ALTERNATIVE C, DISAGGREGATED

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	5586	6575	7027	7343	7589	8038	8016	7851
ARCH	4970	5564	6038	6383	6741	7092	7100	6958
BIOL	18991	20694	21349	21693	22224	22873	22575	21998
BUSN	69538	82265	85035	88397	91350	94522	93781	91578
COMM	5081	5589	6150	6503	6859	7210	7215	7078
CPSC	5279	6392	6694	6886	7122	7382	7319	7149
EDUC	215553	224751	231608	235123	240702	247596	244275	237995
ENGN	29763	30914	29594	28150	27283	25889	25759	24723
ARTS	17012	17303	17161	16861	16807	15940	16486	15951
HLTH	17037	19078	21174	22761	24328	25812	25980	25562
LAW	2703	2189	2223	2230	2260	2308	2266	2203
LTTR	34763	34306	33873	33151	32934	33109	32162	31091
MATH	9746	9493	8635	7809	7217	6828	6347	5995
PHYS	14693	14543	13999	13386	13035	12895	12387	11905
PSYC	16219	17270	18030	18498	19094	19762	19576	19111
PUBL	22013	26793	29432	31402	33384	35286	35432	34822
SOC	42608	41262	40349	39145	38601	38578	37322	36004
PROF	19665	20723	21649	22223	22950	23760	23541	22984
OTHR	11340	11891	10966	10055	9420	9021	8462	8032
TOTL	561850	597695	612000	618000	630000	646000	636000	619000

TABLE C2 (CONTINUED)

	1981	1982	1983	1984	1985	1986	1987	1988	1989
AGRC	7483	7217	6913	6951	7090	7561	8283	8194	7813
ARCH	6541	6405	6135	6158	6292	6799	7350	7272	6934
BIOL	20967	20221	19368	19475	19866	21465	23206	22958	21891
BUSN	87288	84181	80630	81074	82702	89359	96609	95573	91135
COMM	6747	6507	6232	6266	6392	6907	7467	7387	7044
CPSC	6814	6571	6294	6329	6455	6975	7541	7461	7114
EDUC	226845	218771	209543	210696	214926	232227	251067	248376	235841
ENGN	23565	22726	21768	21888	22327	24124	26081	25802	24603
ARTS	15204	14563	14044	14122	14405	15555	16827	16647	15874
HLTH	24354	23497	22505	22630	23084	24942	26956	26677	25438
LAW	2099	2025	1939	1950	1989	2149	2324	2299	2192
LTTR	29634	28580	27374	27525	28077	30338	32799	32447	30940
MATH	5714	5510	5278	5307	5414	5849	6324	6256	5966
PHYS	11347	10944	10482	10540	10751	11617	12559	12424	11847
PSYC	18216	17567	16827	16919	17259	18548	20161	19945	19019
PUBL	33190	32009	30659	30828	31446	33978	36734	36341	34653
SOC	34317	33096	31700	31874	32514	35132	37982	37574	35830
PROF	21907	21128	20237	20348	20756	22427	24247	23987	22873
OTHR	7656	7383	7072	7111	7253	7837	8473	8382	7993
TOTL	590000	569000	545000	548000	559000	604000	653000	646000	616000

TABLE C3: PH.D. COMPL. COEFF. PROJECTION, ALT. C, DISAGGR. (IN PERCENT.)

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	24.59	24.16	23.80	23.51	23.29	23.15	23.08	23.09
ARCH	2.52	2.59	2.64	2.68	2.71	2.74	2.75	2.75
BIOL	21.32	20.67	20.13	19.70	19.37	19.16	19.05	19.05
BUSN	1.76	1.78	1.79	1.80	1.80	1.81	1.81	1.81
COMM	5.90	5.73	5.59	5.48	5.40	5.35	5.32	5.32
CPSC	5.06	3.72	2.59	1.69	1.02	0.57	0.35	0.35
EDUC	4.03	3.86	3.71	3.60	3.51	3.45	3.42	3.42
ENGN	9.33	8.92	8.58	8.31	8.11	7.98	7.91	7.91
ARTS	3.35	2.89	2.49	2.18	1.94	1.78	1.70	1.70
HLTH	7.56	7.74	7.88	8.00	8.09	8.15	8.18	8.18
LAW	1.20	1.19	1.18	1.18	1.18	1.18	1.18	1.18
LTTR	10.06	10.18	10.28	10.37	10.43	10.47	10.49	10.49
MATH	7.61	7.19	6.83	6.55	6.34	6.20	6.13	6.13
PHYS	21.37	20.51	19.79	19.22	18.79	18.50	18.36	18.36
PSYC	18.91	18.70	18.53	18.39	18.29	18.22	18.19	18.19
PUBL	2.03	2.10	2.15	2.20	2.23	2.25	2.26	2.26
SOC	9.77	9.60	9.45	9.34	9.25	9.20	9.17	9.17
PROF	6.25	6.82	7.29	7.67	7.95	8.14	8.23	8.23
OTHR	1.26	1.29	1.32	1.34	1.35	1.35	1.37	1.37
TOTL	5.85	6.56	6.31	6.11	5.96	5.86	5.81	5.81

TABLE C4: M.A. COMPL. COEFF. PROJECTION, ALT. C, DISAGGR. (IN PERCENT.)

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	53.72	52.84	52.11	51.52	51.08	50.78	50.64	50.64
ARCH	70.63	70.38	70.18	70.01	69.89	69.81	69.77	69.77
BIOL	35.54	34.95	34.47	34.08	33.78	33.59	33.49	33.49
BUSN	49.36	49.96	50.46	50.86	51.16	51.36	51.46	51.46
COMM	63.18	62.24	61.47	60.84	60.38	60.07	59.91	59.91
CPSC	45.31	42.35	39.88	37.91	36.43	35.44	34.95	34.95
EDUC	58.33	59.96	61.32	62.40	63.22	63.76	64.03	64.03
ENGN	52.11	53.31	54.31	55.11	55.71	56.11	56.31	56.31
ARTS	52.53	53.11	53.59	53.98	54.27	54.46	54.56	54.56
HLTH	70.07	70.13	70.19	70.23	70.26	70.28	70.29	70.29
LAW	50.18	52.21	53.90	55.25	56.27	56.94	57.28	57.28
LTTR	42.41	41.64	41.00	40.49	40.11	39.85	39.72	39.72
MATH	41.62	41.54	41.48	41.43	41.39	41.36	41.35	41.35
PHYS	37.97	38.34	38.65	38.90	39.08	39.20	39.26	39.26
PSYC	43.48	44.15	44.72	45.17	45.50	45.73	45.84	45.84
PUBL	72.22	74.52	76.44	77.98	79.13	79.90	80.28	80.28
SOC	41.52	40.63	39.89	39.30	38.85	38.55	38.41	38.41
PROF	72.55	73.32	73.88	74.33	74.67	74.89	75.00	75.00
OTHR	22.37	23.99	25.33	26.41	27.22	27.76	28.03	28.03
TOTL	52.10	52.94	53.63	54.19	54.61	54.89	55.03	55.03

TABLE C5: PH.D. PROJECTION, ALTERNATIVE C, DISAGGREGATED

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	930	1070	1202	1303	1391	1488	1611	1697
ARCH	69	83	97	114	134	151	165	175
BIOL	3440	3554	3642	3679	3790	3878	4047	4144
BUSN	983	1088	1160	1214	1314	1435	1550	1604
COMM	175	199	227	246	273	302	325	346
CPSC	198	174	130	87	57	35	23	24
EDUC	7293	7225	7156	7220	7460	7733	7890	8072
ENGN	3312	3052	2704	2433	2384	2373	2337	2242
ARTS	585	487	409	345	325	305	292	289
HLTH	578	735	948	1196	1380	1556	1718	1851
LAW	27	26	27	29	29	28	26	26
LTTR	3556	3772	3876	3834	3703	3592	3543	3495
MATH	1031	942	840	721	645	576	530	483
PHYS	3631	3474	3260	2995	2795	2667	2566	2474
PSYC	2339	2570	2761	2860	2997	3129	3261	3372
PUBL	230	280	341	419	503	587	661	711
SOC	4289	4395	4303	4092	3929	3808	3690	3609
PROF	954	1100	1229	1412	1543	1683	1772	1833
OTHR	196	211	220	189	176	155	150	139
TOTL	33826	34438	34532	34385	34826	35501	36157	36596

TABLE C5 (CONTINUED)

	1981	1982	1983	1984	1985	1986	1987	1988	1989
AGRC	1775	1826	1839	1795	1735	1663	1622	1612	1670
ARCH	185	192	194	190	183	176	171	170	176
BIOL	4241	4297	4283	4162	4012	3845	3751	3728	3861
BUSN	1656	1689	1690	1646	1588	1522	1484	1475	1528
COMM	365	377	381	373	361	346	337	335	347
CPSC	25	25	25	25	24	23	22	22	23
EDUC	8255	8359	8328	8091	7800	7476	7291	7247	7506
ENGN	2170	2107	2040	1952	1872	1794	1750	1739	1802
ARTS	288	285	281	271	260	249	243	242	251
HLTH	1987	2075	2109	2053	2001	1918	1871	1860	1926
LAW	27	27	27	26	25	24	23	23	24
LTTR	3468	3433	3369	3248	3122	2992	2919	2901	3005
MATH	446	417	392	369	352	337	329	327	339
PHYS	2406	2345	2276	2181	2093	2006	1956	1944	2014
PSYC	3477	3542	3543	3449	3328	3189	3110	3092	3202
PUBL	755	786	795	781	755	723	706	701	726
SOC	3554	3499	3419	3289	3160	3029	2954	2935	3041
PROF	1891	1927	1928	1878	1811	1736	1693	1683	1743
OTHR	130	123	116	110	105	101	98	98	101
TOTL	37101	37331	37036	35904	34587	33148	32331	32136	33284

TABLE C6: M.A. PROJECTION, ALTERNATIVE C, DISAGGREGATED

	1973	1974	1975	1976	1977	1978	1979	1980
AGRC	2939	2997	3194	3504	3670	3817	3982	4065
ARCH	2733	3236	3696	4061	4341	4581	4825	4951
BIOL	6581	6639	6839	7164	7271	7376	7552	7611
BUSN	32820	34030	38324	42798	44619	46158	47850	48475
COMM	2642	2943	3310	3605	3823	4013	4215	4321
CPSC	2276	2203	2327	2480	2474	2482	2534	2569
EDUC	112739	123789	135020	142387	147523	151688	155327	157471
ENGN	15385	15264	16206	16673	16085	15552	15253	14823
ARTS	8001	8749	9195	9301	9231	9168	9206	9118
HLTH	9741	11257	12674	14134	15435	16548	17623	18203
LAW	1181	1369	1318	1219	1253	1278	1308	1310
LTTR	16156	15038	14160	13804	13441	13168	13117	12964
MATH	4840	4364	3990	3755	3403	3108	2904	2724
PHYS	6087	5768	5650	5551	5351	5179	5091	4963
PSYC	6616	7042	7488	7972	8310	8595	8906	9016
PUBL	12694	15209	18554	21922	24070	25882	27565	28388
SOCs	18439	17496	16727	16035	15442	14987	14820	14575
PROF	12925	13749	14920	15748	16379	16915	17517	17738
OTHR	3464	3250	2943	3018	2851	2703	2584	2450
TOTL	278259	294393	316635	335131	344981	353198	363178	365734

TABLE C6 (CONTINUED)

	1981	1982	1983	1984	1985	1986	1987	1988	1989
AGRC	4017	3882	3722	3577	3510	3555	3735	4037	4171
ARCH	4907	4747	4551	4374	4292	4347	4567	4936	5101
BIOL	7464	7195	6898	6630	6505	6588	6921	7481	7731
BUSN	47692	46021	44118	42405	41606	42139	44270	47849	49447
COMM	4282	4141	3970	3816	3744	3792	3984	4306	4450
CPSC	2528	2440	2339	2248	2206	2234	2347	2537	2621
EDUC	154397	148817	142662	137123	134538	136261	143154	154725	159895
ENGN	14214	13596	13034	12528	12291	12449	13079	14136	14608
ARTS	8848	8498	8147	7831	7683	7781	8175	8836	9131
HLTH	18115	17548	16822	16169	15864	16067	16880	18244	18854
LAW	1280	1232	1181	1135	1114	1128	1185	1281	1324
LTTR	12563	12061	11562	11113	10904	11044	11602	12540	12959
MATH	4352	2421	2321	2231	2188	2217	2329	2517	2601
PHYS	4769	4565	4376	4206	4127	4180	4391	4746	4905
PSYC	8867	8555	8201	7883	7734	7833	8230	8895	9192
PUBL	28201	27301	26172	25156	24682	24998	26263	28385	29334
SOCs	14080	13503	12945	12442	12208	12364	12990	14040	14509
PROF	17447	16835	16139	15512	15220	15415	16194	17503	18088
OTHR	2311	2198	2108	2026	1987	2013	2115	2286	2362
TOTL	358536	345558	331267	318405	312403	316405	332411	359278	371282

Bibliography

- Adkins, Douglas L., "The American Educated Labor Force: An Empirical Look at Theories of Its Formation and Composition", in Margaret S. Gordon (ed), Higher Education and the Labor Market, McGraw-Hill, New York, 1974
- _____, The Great American Degree Machine, McGraw-Hill, New York, 1975
- The Carnegie Commission on Higher Education, New Students and New Places, McGraw-Hill, New York, 1971
- Cartter, Allan M., "Higher Education in the Last Third of the Century", Educational Record, vol. 46, no. 2, pp. 119-128, 1965 (a)
- _____, "A New Look at the Supply and Demand for College Teachers", Educational Record, vol. 46, no. 3, pp. 267-277, 1965 (b)
- _____, "The Academic Labor Market", in Margaret S. Gordon (ed), Higher Education and the Labor Market, McGraw-Hill, New York, 1974
- _____, Ph.D.'s and the Academic Labor Market, McGraw-Hill, New York, 1976
- Freeman, Richard B., The Market for College Trained Manpower, Harvard University Press, Cambridge, Mass., 1971
- _____, "Demand for Labor in a Nonprofit Market: University Faculty", Discussion Paper Series no. 330, Harvard Institut of Economic Research, Harvard University, Cambridge, Mass., Nov. 1973
- _____, The Overeducated American, Academic Press, New York, 1976
- _____, and D.W. Breneman, "Forecasting the Ph.D. Labor Market: Pitfalls for Policy", technical report no. 2, The National Board on Graduate Education, Washington, D.C., April 1974
- Haggstrom, Gus W., "The Growth of Graduate Education in the Post-Sputnik Era", Working Paper for the Carnegie Commission on Higher Education, Berkeley, California, 1970
- National Center for Education Statistics, Students enrolled for Advanced Degrees, 1974, and former publications in this series, U.S. Government Printing Office, Washington, D.C.
- _____, Earned Degrees Conferred, 1973, and former publications in this series, Washington, D.C.